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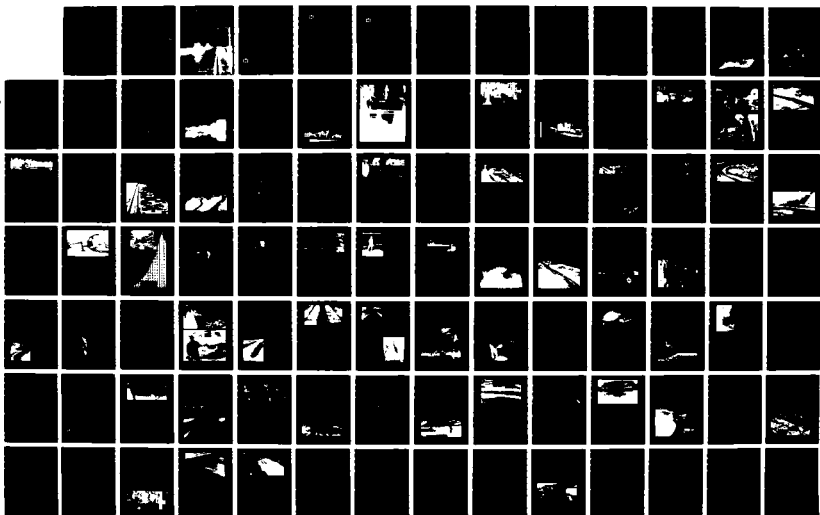
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LA PLANNING DIV 1907

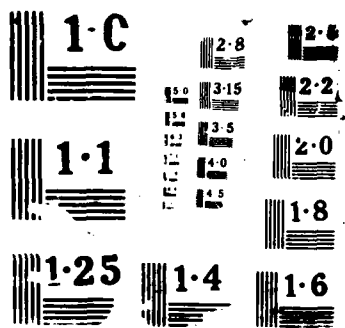
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US Army Corps
of Engineers

Water Resources Development in Louisiana 1987

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Water Resources Development in Louisiana 1987



**US Army Corps
of Engineers**

Lower Mississippi
Valley Division

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US Army Corps of Engineers

To Our Readers:

Our Nation's water resources program, as well as our Constitution, may well have been born on the banks of the Potomac River in the 1780s out of a disagreement between Virginia and Maryland.


Both states claimed jurisdiction over navigation on the Potomac and Pokemoke Rivers and the Chesapeake Bay. Under the Articles of Confederation, the Continental Congress did not have the power to resolve the dispute and regulate commerce. Fortunately, the states decided to meet to settle the matter. A convention was held at Mount Vernon in 1785; and again in Annapolis in 1786.

Out of those two meetings grew the belief that a strong central government was needed. At the very least, the Articles of Confederation needed to be amended. The convention attendees petitioned Congress in February 1787 and the Constitutional Convention was held in Philadelphia that May.

Thus, in celebrating the bicentennial of the United States Constitution this year, we are, in a way, celebrating the birth of our water resources program. The program encompasses port and river navigation improvements, flood damage reduction, beach erosion control, hydropower generation, water storage, development regulation in navigable waters and wetlands, and recreation. In all, the Corps manages almost 2,000 water resource projects across the Nation. It does this in cooperation with local interests and other Federal agencies.

This year, the Corps has the additional challenges of the projects authorized by Public Law 99-662, the Water Resources Development Act of 1986. This act lays the foundation for water resource development for generations to come.

This booklet is one of a series detailing water resources programs in the 50 states and U.S. possessions. I hope you find it interesting and useful.


E.R. HEIBERG III
Lieutenant General, USA
Chief of Engineers



US Army Corps of Engineers

To Our Readers:

Enactment of the Water Resource Development Act of 1986 provides our Nation with a framework for water resources development until well into the 21st century. The law has made numerous changes in the way potential new projects are studied, evaluated and funded. The major change is that non-Federal cost sharing is specified for most Corps water resources projects. A new partnership now exists between the Federal government and non-Federal government to spread its resources over more water projects than would have been possible before.

With the passage of this law, the Federal water resources program is in better shape than at any time in the past 16 years. The law authorizes over 260 new projects for inland navigation, harbor improvement, flood control, and shore protection - with additional benefits in water supply, hydropower and recreation.

I hope this booklet gives you a glimpse of the extent, variety and importance of the U.S. Army Corps of Engineers water resources development activities in your State.

JOHN S. DOYLE, JR.
Acting Assistant Secretary of the Army
(Civil Works)

Civil Works Overview

Introduction

From 1775 to the present, the U.S. Army Corps of Engineers has served the Nation in peace and war.

Formed by General George Washington during the Revolutionary War as the engineering and construction arm of the Continental Army, the Corps built fortifications and coastal batteries to strengthen the country's defenses and went on to found the Military Academy at West Point, to help open the West, and to develop the Nation's water resources. Today it is the largest engineering organization in the world.

Although the primary mission of the Corps has always been to provide combat support to our fighting Army, the Nation over the years also needed roads, railroads, lighthouses, bridges, and other works of engineering. Consequently, since the period immediately following the Revolutionary War, the Corps has carried out numerous civil works responsibilities, and since 1824, it has been the principal developer of the Nation's water resources.

Ever responsive to the changing needs and demands of the American people, the Corps has planned and executed national programs for navigation, flood control, water supply, hydro-electric power, recreation, conservation, and preservation of the environment. In its military role, the Corps plans, designs and supervises the construction of modern facilities which are necessary to ensure the combat readiness of our Army and Air Force.

Authorization and Planning Process for Water Resources Projects

Water resources activities are initiated by local interests, approved by the Administration, authorized by Congress, funded by Federal and non-Federal sources, and constructed by the Corps under the Civil Works Program.

The Water Resources Development Act of 1986 made numerous changes in the way potential new water resources projects are studied, evaluated and funded. The major change is that the law now specifies non-Federal cost-sharing for most of the Corps water resources projects.

When local interests feel that a need exists for improved navigation, flood protection, or other water resources development, they may petition their representatives in Congress. (Technical assistance and some small projects can be accomplished without Congressional authorization under the Continuing Authorities Program.) Once Congress is petitioned, a Congressional committee resolution or an Act of Congress may then authorize the Corps of Engineers to investigate the problem and submit a report. The report contains the necessary engineering, economic, and environmental investigations which include consideration of the full range of alternative solutions to the problem.

Public meetings are held to determine the view of local interests on the extent and type of improvements desired, as well as the need for the improvement. The desires of local interests and the views of Federal, State, and other agencies receive full consideration during the planning process.

Considerations which enter into recommendations for project authorization to Congress include determinations that benefits will exceed costs, and that the engineering design of the project is sound, best serves the needs of the people concerned, makes the wisest possible use of the natural resources involved, and adequately protects the environment.

A report, along with a final environmental statement, is then submitted to higher authority for review and recommendations. After review and coordination with all interested Federal agencies and Governors of affected States, the Chief of Engineers forwards the report, with the environmental statement, to the Secretary of the Army, who obtains the views of the Office of Management and Budget before transmitting the report and environmental statement to Congress.

Budget recommendations are based on evidence of support by the State and by the ability and willingness of non-Federal sponsors to provide their share of the project cost.

If Congress includes the project in an authorization bill, enactment of the bill constitutes authorization of the project. Once a project is authorized, further studies may be required to reaffirm the basic plan presented by Congress.

Appropriation of money to build a particular project is usually included in the annual Energy and Water Development Appropriation bill, which must be approved by both Houses of the Congress and the President.

Navigation

Federal interest in navigation improvements stems from the Commerce Clause of the Constitution, and from subsequent decisions of the Supreme Court to the effect that the Federal obligation to regulate navigation and commerce also includes the right to make necessary improvements. The Corps of Engineers was first assigned responsibility for improving rivers and harbors in 1824. Today, the Corps is responsible for construction, as well as the maintenance and operation, of Federal river and harbor projects.

The system of harbors and inland waterways remains one of the most important parts of the Nation's transportation system. Without constant supervision, rivers and other waterways collect soil, debris and other obstacles which lead to groundings and wrecks. New channels and cutoffs appear frequently; they and the main traffic lanes require diligent patrolling. Where authorized to do so, the Corps maintains the Nation's waterways in navigable condition for both business and recreational purposes, benefiting the economy and helping prevent loss of lives.

Flood Control and Flood Plain Management

Federal interest in flood control began in the alluvial valley of the Mississippi River in the 19th century when the interrelationship of flood control and navigation became apparent. Corps authority for flood control work was extended in 1936 to embrace the entire country. After a series of disastrous floods affecting wide areas, including transportation systems, it was recognized that the Federal Government should participate in the solution of problems affecting the public interest when they are too large or complex to be handled by State or local organizations.

The purpose of flood control works is to regulate floodflows and thus prevent flood damage. In addition, the Flood Control Act of 1944 provided that "flood control" shall include major drainage of land. These objectives are accomplished with reservoirs, local protection works, or combinations of the two.

Reservoirs constructed for flood control storage often include additional storage capacity for multiple-purpose uses, such as the storage of water for municipal and industrial use, navigation, irrigation, development of hydroelectric power, conservation of fish and wildlife, and recreation.

Local protection works are turned over to non-Federal authorities for maintenance, as are small reservoirs with a local impact.

The Corps fights the Nation's flood problems by not only constructing and maintaining flood control structures, but also by providing detailed technical information on flood hazards. Under the Flood Plain Management Services Program, the Corps provides (on request) flood

hazard information, technical assistance and planning guidance to other Federal agencies, States, local governments and private individuals. These data are designed to aid them in planning for floods and providing for the regulation of flood plain area, thus avoiding unwise development in flood-prone areas.

As an example, if community officials know what areas flood in their community and how often this could occur, they then can take necessary action to prevent or minimize damages to existing and to new buildings and facilities by adopting and enforcing zoning ordinances, building codes, and subdivision regulations. The data on flooding and assistance in preparing the various regulations are the type of help available through the Flood Plain Management Services Program.

The Flood Plain Management Services Program also provides assistance to other Federal agencies and to State agencies in the same manner. Flood hazards data are developed and provided on request to the extent and detail needed so that those agencies can properly consider the flood hazards in the execution of their programs.

Shore and Hurricane Protection

The Corps' work in shore protection began in 1930, when Congress directed it to study ways to reduce erosion along U.S. seacoasts and the Great Lakes. While each situation the Corps studies requires different considerations, engineers look at each one with structural and nonstructural solutions in mind. Engineering feasibility and economic efficiency are considered along with environmental and social impacts.

Recommendation for Federal participation is based on shore ownership, use and type and incidence of benefits. If there is no public use or benefit, Federal participation is not recommended. Maintenance of the restored shore is a non-Federal responsibility.

The Corps' work in hurricane protection began with a 1955 law when Congress directed it to conduct general investigations along the Atlantic and Gulf Coasts to identify problem areas and determine the feasibility of protection. These eastern and southern seaboard have been the sites of catastrophic loss of life and property due to hurricanes.

In some cases, abnormal storm-induced tidal flooding can be prevented or reduced by protective structures, including dams and barriers in estuaries, with openings for navigation. Other measures include raising dunes and constructing dikes, walls, and breakwaters. There are also places where increasing the height of natural beaches affords effective protection.

Hydropower

The Corps has played a significant role in meeting the Nation's electric power generation needs by building and operating hydropower plants in connection with its large multiple-purpose dams. In a series of laws and resolutions dating back to the Rivers and Harbors Act of 1909, Congress has directed the Corps of Engineers to give consideration in its reports to various water uses, including hydroelectric power.

The Corps continues to consider the potential for hydroelectric power development during the planning process for all water resources projects involving dams and reservoirs. In most instances, however, hydropower facilities at Corps projects are now developed by non-Federal interests without Federal assistance. The Corps becomes involved with planning, constructing and operating hydropower projects only when it is impractical for non-Federal interests to do so.

Water Supply

The Water Supply Act of 1958 authorized the Corps to provide additional storage in its reservoirs for municipal and industrial water supply at the request of local interests, provided those interests agree to pay the cost in granting this authority; however, Congress stipulated that no more than 30% of the construction costs of a project may be for water storage.

The Flood Control Act of 1944 provided that the Corps reservoirs may, without cost to the local community, be used for irrigation upon recommendation of the Secretary of the Interior, and in conformance with the Reclamation Act of 1902, which applies in 17 western States. In other States, non-Federal entities must assume half the cost of reservoir capacity allocated to irrigation.

Reservoir capacity can also be used for water quality control and streamflow regulation, as authorized by the Federal Water Pollution Control Act Amendments of 1961.

Environmental Quality

In conducting its Civil Works Program, the Corps must comply with many environmental laws, executive orders, and numerous regulations relating to the environment. Consideration of the environmental impacts of a Corps project begins in the early planning stages, and continues through design, construction and operation of the project. The Corps must also comply with many of these environmental regulations in conducting its regulatory programs (See next section). The National Environmental Policy Act (NEPA) of 1969 is the national charter for the protection of the environment, and its procedures ensure that public officials and private citizens may obtain and provide environmental information before Federal agencies make decisions concerning the environment. Corps of Engineers project planning procedures under NEPA often point out the need for more extensive environmental studies, namely, the preparation of environmental impact statements. In selecting alternative project designs, the Corps strives to choose options with minimum environmental impact.

Regulatory Programs

With its regulatory program, the Corps of Engineers has a mandate to protect navigation by regulating construction by others in navigable waterways under Section 10 of the Rivers and Harbors Act of 1899. Section 404 of the Clean Water Act, which further refined the 1972 Federal Water Pollution Control Act and related court decisions, greatly broadened the Corps' regulatory authority to include the discharge of dredged or fill material into "waters of the United States," a term which includes certain wetlands and other valuable aquatic areas. Section 404 of the Clean Water Act requires notification of the public and opportunity for public hearings before the issuance of a permit.

The Corps' regulatory program now focuses primarily on weighing the economic and environmental benefits of development versus ecosystem preservation in deciding whether a permit for a proposed activity would be "contrary to the public interest." When reviewing permit applications, the Corps looks at all the relevant factors, including conservation, economics, aesthetics, general environmental concerns, historic values, wetland values, fish and wildlife values, flood damage prevention, land use classifications, navigation, recreation, water supply, water quality, energy needs, food production and the general welfare of the public.

In response to the President's Task Force on Regulatory Relief to reduce the burden of paperwork involved in processing individual Department of the Army permits, the Corps of Engineers has introduced a number of nationwide permits which require little or no processing, and taken other measures to streamline the permit application process while maintaining environmental safeguards. The separate Corps of Engineers Districts have also issued general permits to certain types of minor works in specific areas which require only minimal processing.

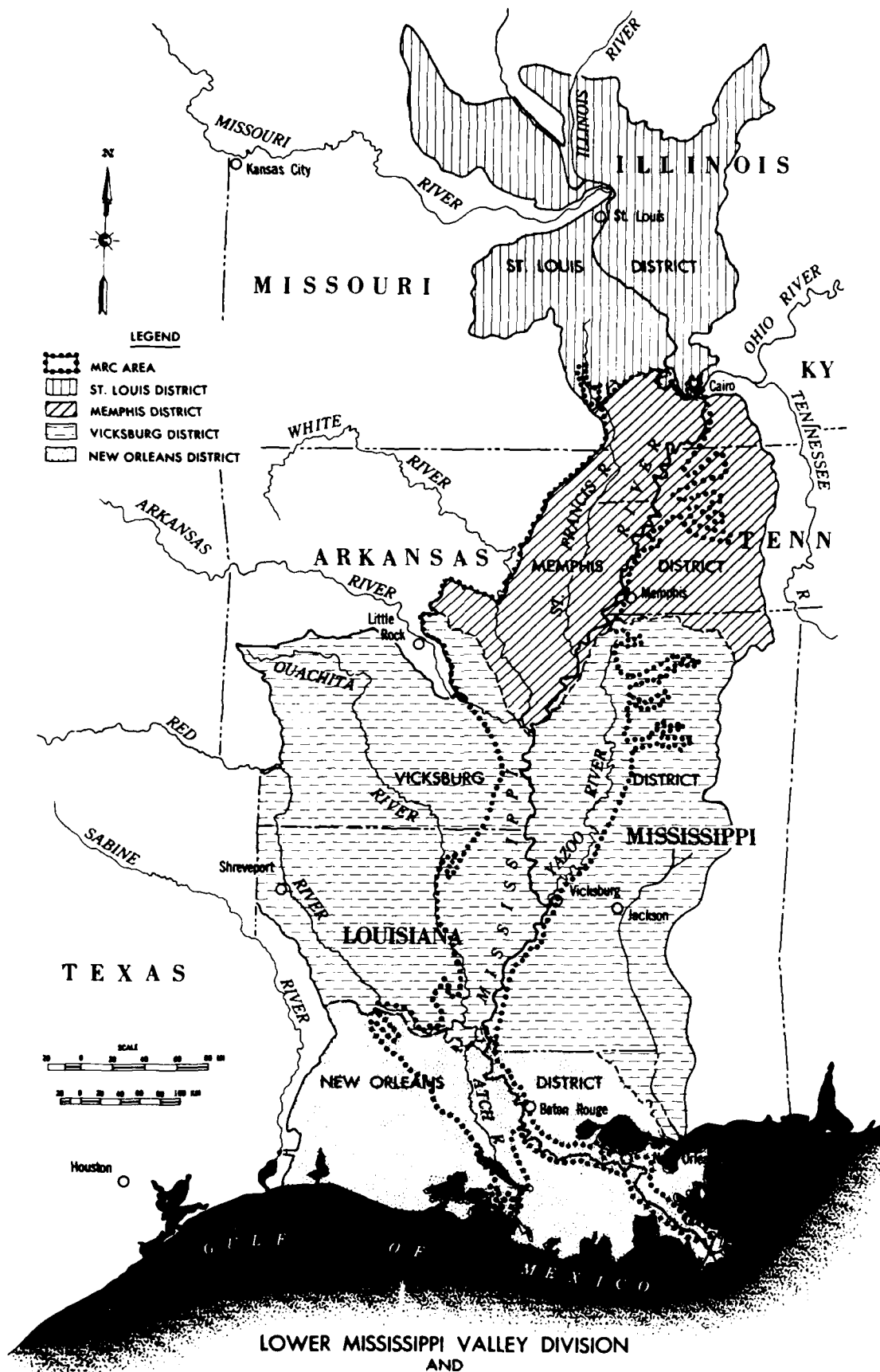
Recreation

The Flood Control Act of 1944, as amended, provides authority to construct, maintain, and operate public park and recreational facilities at water resources development projects under the control of the Secretary of the Army, and to permit the construction, maintenance, and operation of such facilities. It also provides that the water areas of projects shall be open to public use generally for boating, fishing, and other recreational purposes.

Emergency Response and Recovery

Corps assistance for emergency disaster response and recovery is available under Corps authorities, such as PL 84-99, Flood Control and Coastal Emergencies, or in support of other agencies, particularly the Federal Emergency Management Agency (FEMA) under PL 93-288 and EO 12148. Corps response activities under the PL 84-99 authority include the following: emergency operations, e.g., flood fight, rescue and emergency relief activities; emergency repair and restoration of flood control works which are threatened, damaged, or destroyed by flood; emergency protection of existing Federal hurricane or shore protection works; the repair or restoration of Federal hurricane or shore protection structures damaged or destroyed by wind, wave or water action of other than ordinary nature; preventive work performed prior to flooding when conditions pose a flood threat to life or property; providing emergency supplies of clean water to any locality confronted with a source of contaminated water, causing or likely to cause a substantial threat to public health and welfare; and provision of water supplies to drought-distressed areas by well drilling on a reimbursable basis or transportation of water at Federal cost.

In support of FEMA's disaster response and recovery activities, Corps mission assignments have included: emergency debris removal, preliminary damage assessments, detailed damage survey reports, temporary housing, emergency snow removal, contracting and construction management, and other support which calls upon the Corps' engineering, contracting and construction expertise.



Mississippi River Basin

Mississippi River Commission

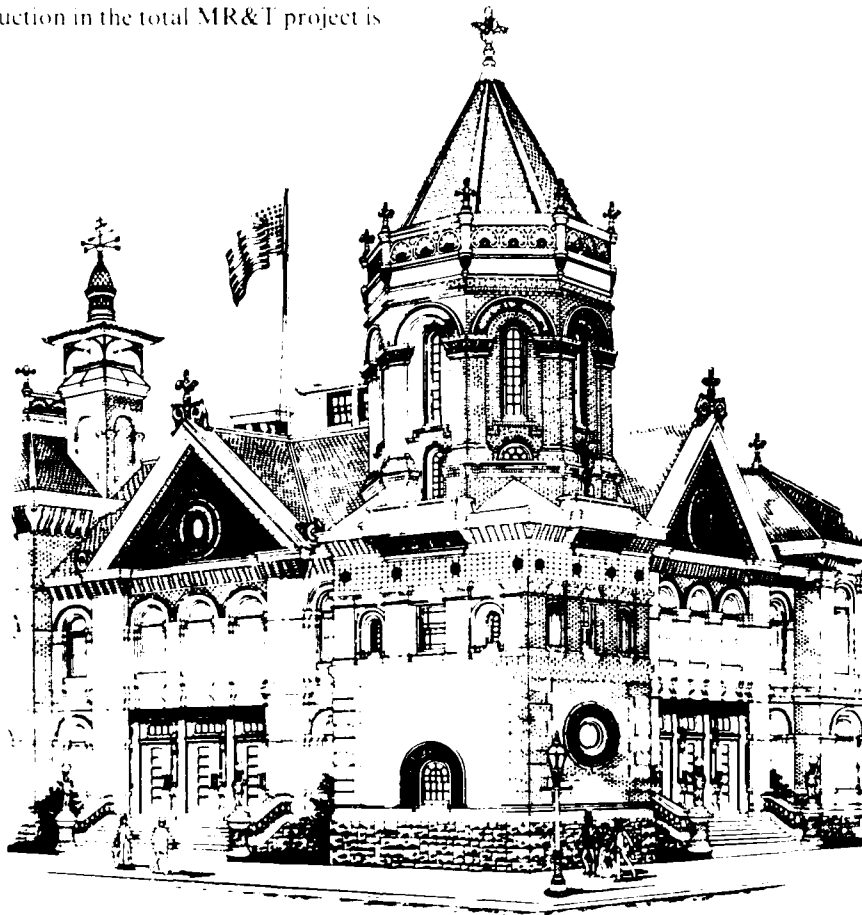
The Mississippi River Commission (MRC) was created by an Act of Congress in 1879 to improve navigation and flood control on the Mississippi River. The MRC was, and is, composed of seven members who are nominated by the President of the United States and confirmed by the Senate.

Until the tremendous flood of 1927, the MRC's main emphasis was on river improvements for navigation. After the flood, however, Congress passed the 1928 Flood Control Act committing the federal government to a comprehensive program of flood control and authorizing the Mississippi River and Tributaries (MR&T) project. The original act has been amended 24 times to adapt to changing conditions and requirements.

Physical construction in the total MR&T project is

about 65 percent complete and is designed to control a "project flood" with a discharge of three million cubic feet per second. This hypothetical project flood is based on the maximum probable runoff from the artificial combination of the most severe rainstorms which have actually occurred at critical points of the basin. The plan is composed of four major features: levees, floodways, channel improvement and tributary basin improvement.

Levees are the backbone of the system and cover more than 2,000 miles along the Mississippi River and principal tributaries—extending from Cape Girardeau, Missouri, to Venice, Louisiana. Their purpose is to confine floodwaters to the main channel and designated floodways.



Mississippi River Commission Building in Vicksburg, Mississippi

Four floodways exist in the MR&T project to divert excess flows in critical locations. The northernmost one is Birds Point-New Madrid in Missouri which was used once, in 1937. The other three — West Atchafalaya, Morganza, and Bonnet Carre — are in Louisiana. West Atchafalaya has never been used, and Morganza was used once, in 1973. However, Bonnet Carre, located just upstream of New Orleans, was the first floodway completed and has been opened seven times — 1937, 1945, 1950, 1973, 1975, 1979 and 1983.

The main components of channel improvement and stabilization are cutoffs, revetments, dikes and dredging. This work is designed to protect the levees, increase the flood carrying capacity and improve navigation.

Tributary basin improvement work includes flood control dams, channel improvements and interior drainage. The four major basins are the St. Francis, Yazoo, Tensas and Atchafalaya.

The Mississippi River and tributaries drain an area of 1.25 million square miles involving 31 states and two Canadian provinces. This involves about 41 percent of the total U.S. land area, excluding Alaska and Hawaii. As water collects from this vast drainage basin — the fourth largest in the world — it has only one way to go, which is through the lower Mississippi River starting at its juncture with the Ohio River at Cairo, Illinois.

The total authorized cost of the MR&T Project including all modifications is \$9.4 billion. Expenditures to date amount to \$4.1 billion, with annual maintenance averaging \$100 million over the last five years. Accumulated benefits brought about by the project since it began amount to \$217 billion at 1986 price levels. A good part of the benefits have been in preventing damages from flood losses.

Mississippi River and Tributaries — Levees (MRC)

Mainline Mississippi River levees in the lower valley are considered one system when describing the project. Levees which protect one particular area also influence the degree of protection afforded areas downstream.

On the Mississippi there are 1,608 miles of levees in the protective system authorized below Cape Girardeau with 1,602 miles in place, including 1,184 miles built to approved grade and section.

The Main Stem Levee System is a line of protection 2,202 miles long with 2,195 miles being in place, including 1,609 miles completed to approved grade and section.

The system includes additional levees and other control structures along the south bank of the Arkansas River (85 miles), along the south bank of the Red River (59 miles) and within the Atchafalaya River Basin (449 miles).

Currently 511 miles of 723 authorized miles of berms narrow shoulders — are completed, and 1,800.5 miles of graveled or hard-surfaced roads have been constructed on these levees.

In addition, 1,608 miles of levees have been authorized off the main stem. To date 1,117.2 miles are in place with 895.1 miles completed to approved grade and section. Berms are completed on 10 miles of the total, while 801 miles of graveled or hard-surfaced roads have been constructed.

Off-Main-Stem Flood Control (MRC)

The MR&T Project also provides for supplementary flood control improvements off the main stem of the Mississippi River, providing local flood control protection in these areas of the lower valley: the St. Francis and Little River Basins in Missouri and Arkansas; at Cairo, Illinois, and vicinity; along the east bank tributaries in western Kentucky and Tennessee; in the lower White and Arkansas River Basins, the Bayou Meto Basin and the Grand Prairie region in Arkansas; the Tensas River Basin in Arkansas and Louisiana; in the Atchafalaya Basin in Louisiana; and in the Yazoo Basin of Mississippi.

Mississippi River and Tributaries Channel Improvements (MRC)

Modern improvements designed to facilitate navigation on the Mississippi River below Cairo, Illinois, have also provided flood control benefits. These were authorized first by the Flood Control Acts of 1928 and 1944. Dikes, concrete revetments and dredging have helped to hold the river in a fixed course while also reducing floods.

Bank stabilization on the Mississippi River is important to both flood control and navigation. The only effective way to protect banks from erosion and caving has been revetment — a protective concrete layer under water and a stone pavement above the waterline.

Revetment in place between Cairo and Baton Rouge on September 30, 1986, extended over 655 miles of banks.

In addition, other work on the Mississippi River between Cairo and Baton Rouge includes: removing snags, wrecks and obstructions; issuing bulletins by the Vicksburg District; providing information on available high-water velocities and selected locations; maintaining bulletin boards showing daily gauge readings at regular MRC gauge locations; contacting pilot service and furnishing navigation interests with latest information.

There were 16 cutoffs on the Mississippi River which were developed between 1933 and 1942 in carrying out authorized channel improvements between Baton Rouge and Cairo.

The measures, combined with other improvements, actually decreased the channel length by 170 miles between the two cities. River velocities, however, increased the attack on the banks, and the river started to regain its length. As a result the net shortening from 1933 to 1962 was 114 miles of the theoretical 170-mile cutoff.

On the Mississippi and lower Ohio rivers there are 865 miles of operative bank revetment and 215 miles of dikes in place with 65 miles of revetment and five miles of dikes on the tributaries.

A navigation channel nine feet deep by 300 feet wide is being achieved by revetment and dikes and, during the low-water season, by dredging where required.

Average maintenance requirements for dredging are showing a steady reduction due to the growing effectiveness of channel improvement programs. An increase in the navigable depth is also being obtained.

Nearly 100 miles of foreshore protection — for that part of the shore uncovered at low tide — has been constructed along the lower Mississippi River.

Mississippi River Cairo to Baton Rouge (MRC)

Channel improvement is an integral part of the MR&I project as authorized by the Flood Control Act of 1928 and its later amendments.

Involved in addition to the project's flood control features are provisions for construction maintenance of a navigable channel from Cairo to Baton Rouge.

The lower Mississippi is the main stem of a proven and dependable navigation system of about 12,500 miles of natural and man-made waterways having navigable depth of six feet or more. It is vital to the continued growth of the United States.

In 1896 Congress authorized a navigation channel nine feet deep and 250 feet wide at low water, between Cairo and Head of Passes. A width of 300 feet was authorized in 1928.

In 1944 the authorized depth from Cairo to Baton Rouge was increased to 12 feet at low water. Width remained at 300 feet. Along this 725-mile segment a minimum low water navigation channel nine feet deep and 300 feet wide is maintained through dredging and other control measures.

Districts of Louisiana

Within the boundaries of the State of Louisiana, three U.S. Army Engineer Districts are responsible for the Corps' projects and activities described in this booklet. District geographic boundaries are shown on the map below. For comparison, Congressional District boundaries are also shown.

Jurisdiction over Engineer District activities is the responsibility of the Division offices. The Mississippi River Commission exercises special jurisdiction over improvements for navigation on the Mississippi River, and for flood control along the river and within its alluvial valley. Additional information on Corps of Engineers and Mississippi River Commission projects, activities, and programs in Louisiana may be obtained from the offices listed here.

President,
MISSISSIPPI RIVER COMMISSION
P.O. Box 80, Vicksburg, Miss. 39180-0080

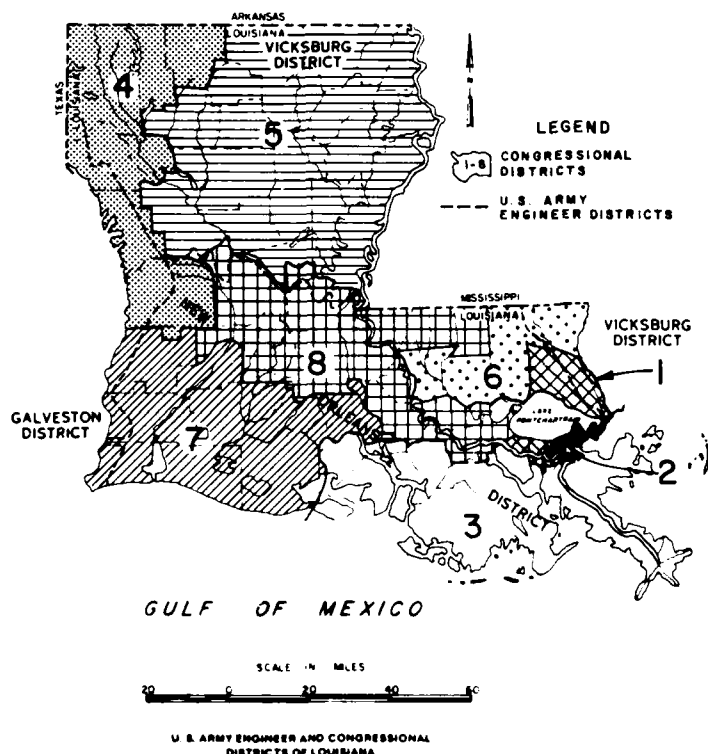
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Galveston, Tex. 77553-1229



Foreword

This booklet presents current information on the scope and progress of water resources development by the U.S. Army Corps of Engineers and the Mississippi River Commission in the State of Louisiana. Also discussed is the role of the Corps in planning, constructing, and operating projects for flood control, navigation, and other beneficial uses of water resources. Projects that are completed, under way, or in the planning stage are described, with the principal activities organized by river basins. A map of each basin is located at the beginning of each section. The material in the booklet is presented in sections that discuss the 12 major river basins in Louisiana:

Mississippi River Basin—area between the Mississippi's banks and main-line levees, plus the watersheds of those east bank tributaries between Baton Rouge and the east-west Louisiana-Mississippi state line.

Atchafalaya River Basin—area between the East and West Atchafalaya Basin protection levees, which extend from the latitude of the town of Simmesport to the Gulf of Mexico.

Ouachita River Basin—tributary area of the Ouachita River in Louisiana.

Tensas River Basin—tributary area of the Tensas River in Louisiana.

Red River Basin—tributary area of the Red River down to the vicinity of Alexandria.

Pearl River Basin—tributary area of the Pearl River in Louisiana.

Lake Pontchartrain Basin—drainage area of Lake Pontchartrain.

Mississippi River Delta Area—area to the east of the East Atchafalaya Basin protection levee, which includes the coastal area between Morgan City and the Louisiana-Mississippi state line.

Vermilion River and Bayou Teche Basins—tributary area of the Vermilion River and Bayou Teche.

Mermentau River Basin—tributary area of the Mermentau River.

Calcasieu River Basin—tributary area of the Calcasieu River.

Sabine River Basin—tributary area of the Sabine River in Louisiana.



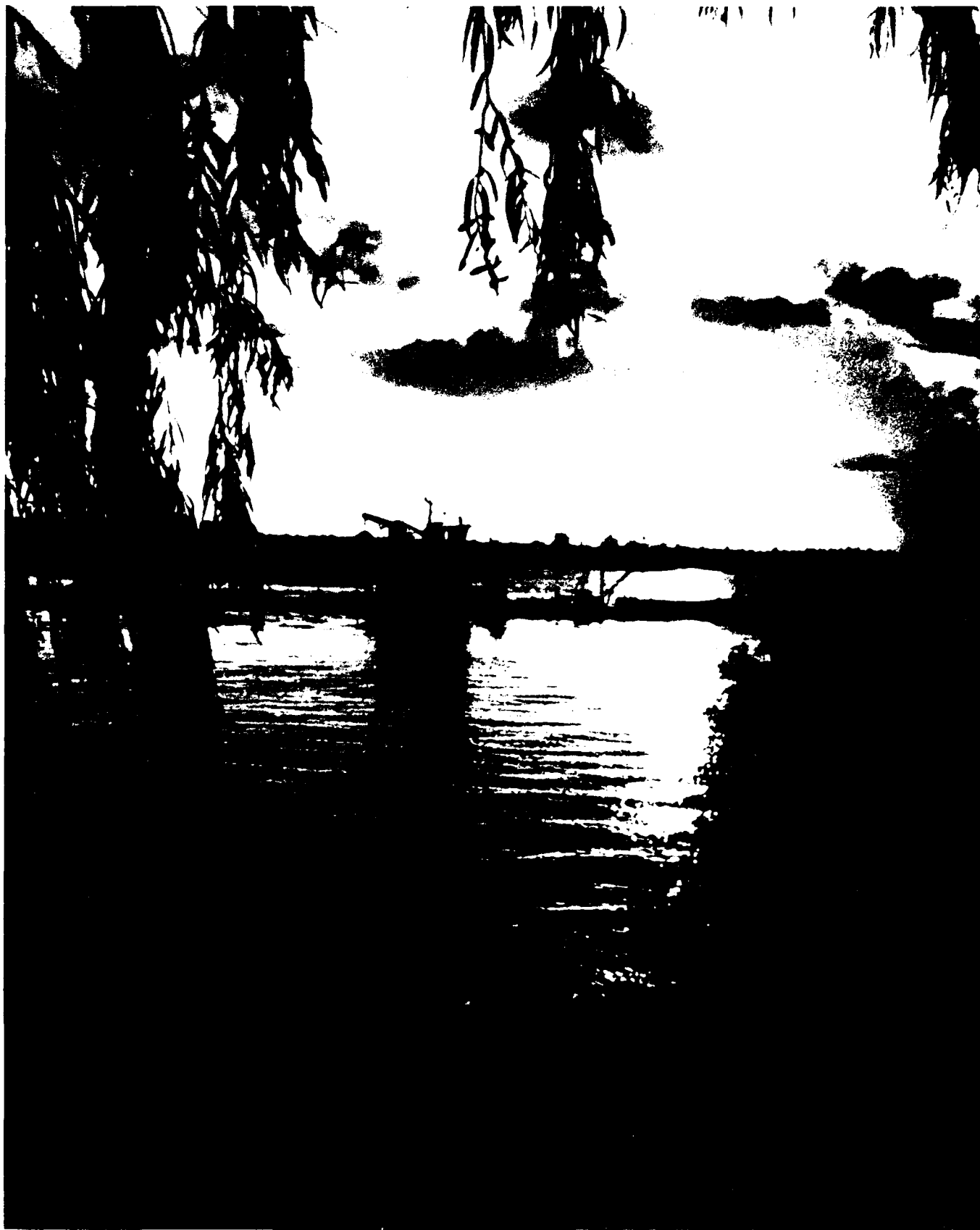
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Introduction

Corps of Engineers—183 Years in Louisiana

The Corps of Engineers has proudly served in the State of Louisiana since the vast wilderness known as the Louisiana Purchase was surveyed for defense in 1804.

This immense stretch of land beckoned as unclaimed treasure, a new frontier of great natural wealth, promise, and challenge. Men willing to accept the challenge poured into the untamed territory, risking their holdings, even their lives, to claim the fertile lands, to establish homes, farms, and businesses, and to fulfill their dreams of prosperity.

During the swelling migration of settlers to the Louisiana territory, the Army Engineers, busy surveying, clearing, building fortifications along the Gulf,

played a role of increasing prominence in the settlement of the frontier.

On the great waterway of this new frontier—the Mississippi River—navigation mounted to a matter of national concern. In 1824, Congress passed a series of laws, including the General Survey Act, that marked the **beginning of the Corps' Civil Works Program.**

By 1829, Army Engineers in Louisiana were not only building military forts for national defense at New Orleans and along the Gulf Coast, but the Corps was also using snag boats to clear the rivers of "planters" and "sawyers"—dead trees toppled into the river by caving banks. Navigable waterways were vital to settlement, commerce, and growth.

Passes of the Mississippi—Over 100 Years of World Navigation

Opening the passes of the Mississippi River to navigation was essential if the great river was to be the principal waterway for national commerce, as well as a link to international trade.

In the delta of the Mississippi, the 19th century river had several mouths to the Gulf of Mexico. At each of these mouths, the river lost velocity and dropped silt, sand, and sediment. Gradually, bars formed, obstructing the river's entrance into the Gulf. At the crest of the bars, the river often was only 8 to 12 feet deep in the major passes.

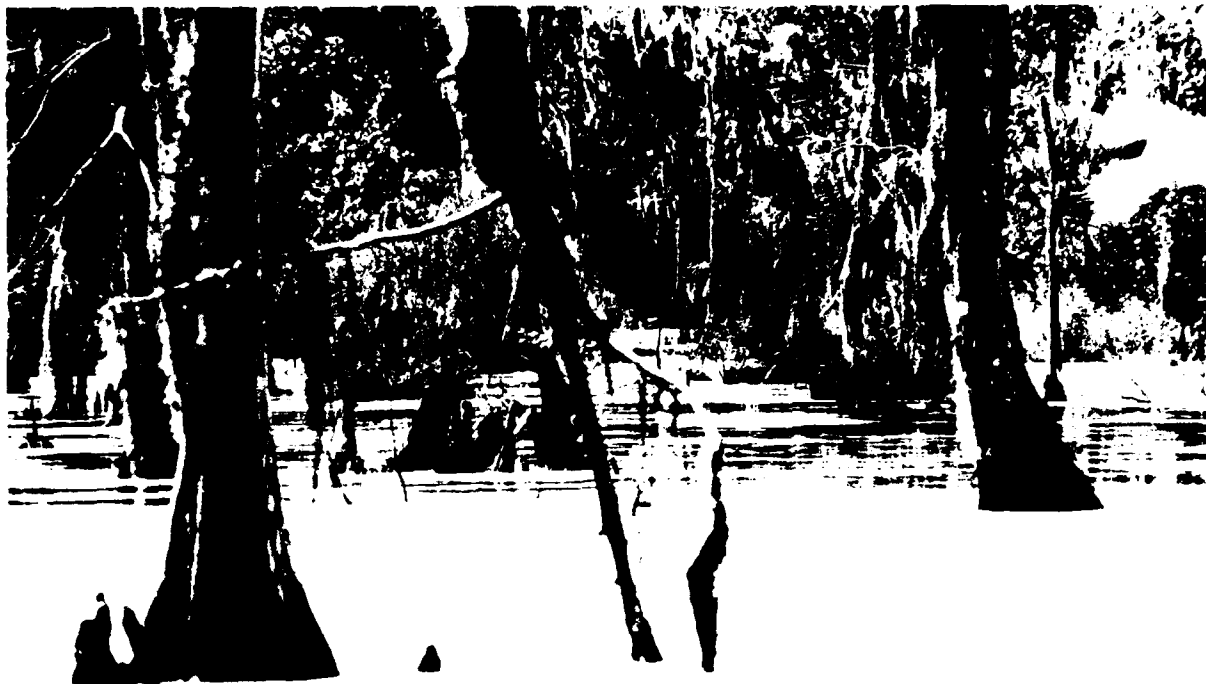
In 1837, recognizing this as a major problem to navigation on the Mississippi, Congress directed the Corps to make a survey of the passes and bars at the river's mouth. The survey recommended a plan for deepening the draft by dredging, but lack of funds prevented progress on the project.

By the late 1960s, many ocean-going ships required 25

feet of water. With bars obstructing the passes to all but shallow-draft boats, the Port of New Orleans began to suffer an economic stranglehold because of increasing isolation from commerce.

Federal action began in 1866 when Congress voted to improve the mouth of the Mississippi. Yet no significant progress had been made by 1873, when James B. Eads, a distinguished civil engineer, advocated constructing a system of parallel jetties. He proposed to create a jetty-guaranteed channel 28 feet deep.

In 1875, Eads began his work in South Pass. He faced a difficult task but pushed the project to successful completion. Two years later, 587 ocean vessels entered the Mississippi by South Pass. In 1879, the Corps of Engineers officially declared that a 30-foot channel existed at the mouth of the Mississippi. The jetty design, now proven successful, would become a standard tool in the Corps' future work on the Mississippi.



Louisiana swamp

Mississippi River Commission— Over 100 Years of Concern

The triumph of the jetties helped in the creation of the Mississippi River Commission. Congress was now ready to come to grips with the problems of navigation and flood control in the alluvial valley of the great river. It was time to adopt a national policy for the protection and development of the Mississippi Valley.

By 1879, growing pressures for navigation improvements, coupled with the recurrence of devastating floods, prompted Congress to establish the Mississippi River Commission. Congress created a seven-member organization responsible for executing a comprehensive plan for flood control and navigation works on the Lower Mississippi. The creation of this new authority marked the Federal Government's commitment to the development of a reliable inland

waterway system, as well as Federal involvement in flood control.

Since the Flood Control Act of 1928, the Mississippi River Commission has served as an advisory body responsible to the Chief of Engineers, U.S. Army. The Mississippi River Commission recommends policy and work programs, studies and reports on modifications or additions to flood control and navigation projects, makes recommendations on any matters authorized by law, conducts inspection trips, and holds public hearings.

The Commission's activities are directed by the President of the Mississippi River Commission, who is also Division Engineer of the Lower Mississippi Valley. The work is performed by three Corps of Engineers Districts, Memphis, Vicksburg, and New Orleans.

Corps of Engineers' Role in Louisiana

The Corps of Engineers in Louisiana has gradually developed into the Federal agency responsible for controlling and making useful the network of Mississippi Delta waterways.

The Corps became a significant agent in transforming much of Louisiana from a primitive flood plain of the Mississippi into a prosperous state of towns and cities,

supported by thriving agriculture and industry.

Today, pursuing its activities in a new age where conservation is as meaningful as development, the Corps of Engineers in Louisiana conducts its duties under the U.S. Army Engineers traditional motto

MISSIONS—Let Us Try

Civil Functions of the Corps of Engineers

Through its Civil Works Program, the Corps carries out a *comprehensive nationwide program* of water resources planning, design, construction, and operation.

Federal water resource development projects are initiated by local interests, authorized by Congress, and constructed by the Corps under the Civil Works Program. In the program, the Corps is the engineer consultant to Congress.

Corps civil works water resources projects are authorized by a process that always involves the public. When the people and governing authorities in a community feel there is need for improved navigation, flood protection, or other resources development, they petition their congressional representative. The senator or representative then requests the appropriate Congressional Committee on Public Works to direct the Corps of Engineers to make a survey and furnish recommendations. Authority for a feasibility study is either a resolution adopted by the Senate or House

Committee on Public Works or an item in a Congressional Act.

The Corps uses a two-phase study process. The first, or reconnaissance phase, is performed at Federal expense. The second, or feasibility phase, is performed in partnership with local interests who cost-share in this phase on a 50 percent Federal and 50 percent non-Federal basis.

During a study, the Corps holds public meetings and workshops. Opinions of local people are fundamental to any Corps study for two reasons. First, the effects of the proposed solutions on the area must be acceptable to the people of the area. Second, in any potential project local participation is required. Other Federal and state agencies concerned with resource planning and development are contacted during the study. The Corps coordinates its programs with these agencies to resolve possible conflicts and to insure compatibility of their programs with the Corps' projects.



Canal to Toulouse Street floodwall in New Orleans

After the best alternative is determined, the Corps submits a feasibility report and environmental impact statement to Congress. When approved, the recommended project is authorized by Congress. However, the project still requires congressional appropriation to transform it into a reality.

To initiate an authorized project, the Corps asks Congress for preconstruction engineering and design funds. When the funds are available, the Corps accomplishes the preconstruction engineering and design. Construction is initiated by the Corps when preconstruction engineering and design are completed and Congress and the local sponsor provide funds for project construction.

The Water Resources Development Act of 1986 requires local interests to provide part of the cost of construction of most new projects. Developing and signing of local cooperation agreements between the Corps and local sponsor are now critically important to the construction of civil works projects.

Completed projects may be operated and maintained by the Corps, or they may be transferred to another agency or to a local government for operation and maintenance.

The Civil Works Program is directed toward water resources development that satisfies both immediate and long-range water requirements. These requirements include navigation, flood control, drainage, water supply for irrigation and municipal-industrial uses, hurricane flood protection, water quality control, hydroelectric power, shore and beach protection, water-oriented recreation, enhancement of fish and wildlife resources, and the study of urban area problems, including wastewater management. Environmental preservation is a major consideration in all Corps efforts.

The Small Water Resource Development Project (Section 201, Flood Control Act of 1965) expedites the authorization of small projects by allowing them to be acted on by a resolution of the Committees on Public Works of the Senate and House of Representatives rather than the Congress as a whole. For such projects, the Corps is authorized to construct, operate, and maintain both single and multipurpose projects involving, but not limited to, navigation, flood control, and shore protection. The estimated Federal first cost of these projects must be less than \$15,000,000.

Project Features

Navigation

Beginning with the act approved in May 1824, Congress authorized investigations and improvements for navigation and related purposes with a series of River and Harbor Acts and Water Resources Development Acts. Basic policies and procedures were established by these laws. The Water Resources Development Act of 1986 clarifies and expands the Federal policy on navigation improvements and establishes general requirements for local cooperation.

The Corps of Engineers also has the responsibility to administer Federal laws for the protection and preservation of navigable waters and adjacent wetlands of the United States. This includes granting permits for structures other than bridges over and in navigable waters, establishing regulations for the use of navigable waters as dumping sites, fishing areas, and harbor lines, and the removal of wrecks and other obstructions to navigation.

The Corps compiles annual statistics on commercial cargoes. This information is used in determining the need and justification for an improvement and the maintenance of rivers and harbors for navigation.

Flood Control

The purpose of flood control projects is to regulate floodflows to prevent flood damages. This is accomplished with flood control storage or levee and channel improvement works. In a flood control storage

project, floodwaters are stored and later released at nondamaging rates.

The Corps of Engineers' involvement in flood control projects began in 1882, when Congress, for the first time, authorized the Mississippi River Commission to build levees. The floods of 1912 and 1913 drew national attention to the need for protection. This prompted the Federal Government to establish a higher priority for flood control projects. Under legislation known as the First Flood Control Act of 1917, levee construction began to reflect a national commitment to prevent floods on the Mississippi and Sacramento Rivers.

The 1927 flood, a major disaster and the worst in the history of the Lower Mississippi Valley, prompted Congress to pass the Flood Control Act in 1928, the long-needed legislation that committed the Federal Government to a comprehensive program of flood control along the Mississippi.

The Act and subsequent amendments established the authority and defined the responsibility of the Mississippi River Commission for flood protection in the alluvial valley. The resulting Mississippi River and Tributaries project is the largest single project of the Corps in the nation.

The Water Resources Development Act of 1986 is the latest act to define Federal policy on flood control improvements and to establish general requirements for local cooperation.



Algiers Point levee setback

Hurricane Protection

Hurricanes have caused catastrophic losses of life and property along the Atlantic and Gulf coasts. In some instances, tidal flooding can be prevented or reduced by protective structures, such as dams and barriers. Other protection measures include raising dunes and constructing dikes, walls, and breakwaters. Increasing the height of natural beaches can also provide protection.

Specific hurricane protection studies must be authorized by a resolution of the House or Senate Public Works Committee. Hurricane protection works that are justified are recommended to Congress for authorization and subsequent construction.

Hydroelectric Power

By a series of laws dating back to the River and Harbor Act of 1909, power development may be included by the Chief of Engineers in multiple-purpose projects when it is collateral with the objectives of flood control and navigation.

Water Supply

Under the Flood Control Act of 1944, the Secretary of the Army is authorized to make contracts with states, municipalities, private concerns, or with individuals for domestic and industrial uses of surplus water that may be available at Corps of Engineers projects. The Water Supply Act of 1958, as amended, makes further provisions for water supply storage in Federal navigation, flood control, irrigation, or multiple-purpose projects.

Recreation

Authority to participate in recreational developments was provided by the 1944 Flood Control Act, as amended by subsequent Flood Control Acts. Under these authorities, the Corps constructs, operates, and maintains public parks and recreational facilities at water resources development projects under its control.

Recreational facilities for public use are generally provided through cooperative efforts of the Corps of Engineers and a non-Federal agency. The Corps cooperates with states and local interests in developing the recreational potential of any Federal water project.

Additionally, fish and wildlife enhancement features may be developed. The enhancement must be economically justified, however, and the non-Federal public must manage the enhancement and bear 25 percent of its separable costs, if the benefits are non-national. If the benefits are national, the Federal government may bear 100 percent of the separable costs. Facilities provided for public use include those necessary for information and guidance, observation and sightseeing, boat launching, picnicking, swimming, fishing, and camping, as well as those necessary for public safety, public health, and the preservation and protection of natural resources.

Public hunting and fishing are encouraged, within limits set by state laws. Conservation measures to improve these resources are undertaken in cooperation with Federal and state fish and game agencies.

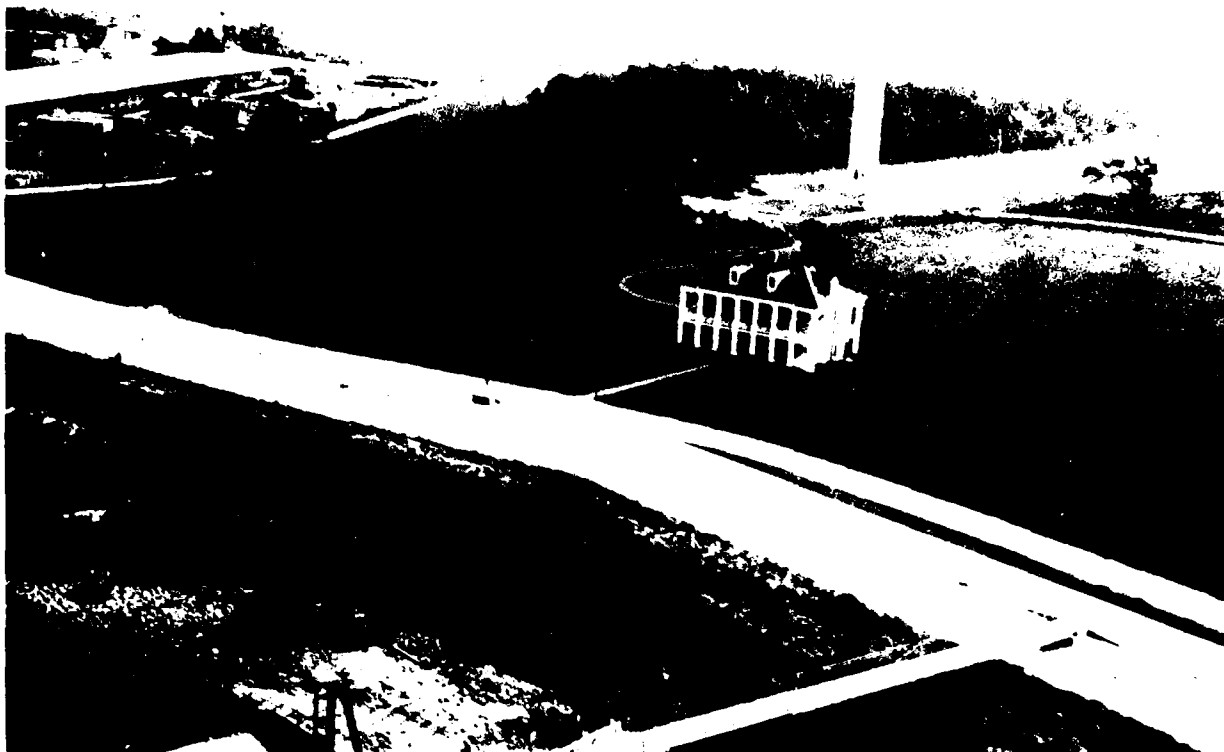
Some flood detention basins that do not have permanent recreation pools have other recreational facilities, such as bridle paths, hiking trails, golf courses, archery ranges, playgrounds, day camping and picnicking facilities, water supply and sanitation systems, and parking areas and access roads. Similar facilities may be provided in conjunction with levee and channel improvement projects.

Fish and Wildlife Conservation

The Fish and Wildlife Coordination Act of 1958 mandates coordination with Federal and state natural resource agencies. The Act permits the Corps of Engineers to include facilities to offset fish and wildlife damages that may occur as a result of project development.



Louisiana's multi-million dollar seafood industry



Levee setback and floodwall at Chalmette battlefield

Programs

Flood Plain Management Services Program

Section 206 of the 1960 Flood Control Act (PL 86-645), as amended, the National Flood Insurance Act of 1968, as amended, Executive Order 11988, Flood Plain Management, authorize the Corps of Engineers to establish and carry out a flood plain management services program. The objective of the program is comprehensive flood damage prevention planning that encourages wise use of flood plains at all levels of government.

Under the program, the Corps prepares flood plain information reports, provides technical assistance, and conducts research on various phases of flood plain management activities. In compliance with Executive Order 11296, the Corps prepares specific flood hazard reports wherever buildings, roads, and other facilities are federally owned, federally financed or involved in federally administered programs, and wherever disposal of Federal land and property is involved.

Flood Plain Information Reports. The Corps of Engineers prepared flood plain reports for specific localities on request of a state or local government agency after approval of the District Engineer. The information was intended to be used by planning groups, zoning boards, private citizens, engineering and planning firms, and real estate and industrial developers. This effort included identification and mapping of areas subject to flooding, compiling flood

frequency and flood damage information, and establishing criteria on flood plain use to aid state and local agencies in developing land-use plans and regulating the use of flood plain areas. The Corps has discontinued conducting flood plain information reports due to the advent of the Flood Insurance Program and Flood Insurance Studies.

Technical Services and Guidance. Technical assistance is given state and local governments in preparation of flood plain regulations. The Corps also assists state and local governments in evaluating and using flood data to make decisions concerning flood hazards. Flood information and guidance are provided to permit wise decisions concerning locations of public buildings, subdivisions, and other land uses. Technical assistance is also given on flood proofing.

Guides, Pamphlets, and Related Research. Pamphlets and guides pertaining to flood plain regulations, flood proofing, and related actions are available to Federal, state, and local governments, and citizens in planning and taking action to reduce flood damage.

Flood Damage Prevention Planning. Comprehensive flood damage prevention planning, at all appropriate government levels, is the ultimate objective of the program. This brings state and local officials into the planning action and insures increased consideration of alternatives, both structural and nonstructural, for flood damage reduction.



Aquatic growth control by use of chemicals

Flood Insurance Studies

The Corps of Engineers carries out flood insurance studies to map eligible communities by risk zones and to determine insurance rates. The studies are made under the provisions of the National Flood Insurance Act of 1968 (PL 90-448), and the Flood Disaster Protection Act of 1973 (PL 93-234). The statutes, administered by the Federal Insurance Administration of the Federal Emergency Management Agency (FEMA), call for services of the private insurance industry and provide for Federal subsidization of flood insurance. The insurance covers damage caused by overflow of either inland or tidal waters on floodprone land, mudslides, and erosion.

Permits Program

The Corps of Engineers exercises regulatory authority in navigable waters of the United States primarily under the River and Harbor Act of 1899 and in other waters of the United States under Section 404 of the Clean Water Act (33 U.S.C. 1344). Regulatory authority is also held under additional authorities, as they are applicable, for activities involving discharges of dredged or fill material into waters of the United States. Permits issued by the Corps are required for work or structures in navigable waters of the United States, as well as for transportation of dredged material for the purpose of dumping into ocean waters. Structures such as piers, wharfs, and docks, and activities such as channel excavation, placement of riprap, groins, buoys, mooring devices, cables, and pipes require permits.

The Corps of Engineers revised its dredge and fill regulations in July 1975 to include nontidal wetlands and a variety of navigable waters. Coastal wetlands

contiguous or adjacent to coastal waters and freshwater wetlands contiguous or adjacent to primary tributaries were added to the Corps' jurisdiction in 1976. Today, any navigable water in which activity will have a significant impact upon the environment is regulated.

The Corps of Engineers evaluates each proposed activity for which a permit is requested on the probable impacts, including cumulative impacts of the proposed activity on the public interest. The decision reflects the national concern for both protection and utilization of important resources. Those benefits that are reasonably expected to accrue are balanced against reasonably foreseeable detriments. Relevant factors such as the following are all considered in evaluations: conservation, economics, esthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore line erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs and cumulative effects of the associable factors. A permit is issued unless the District Engineer determines that it will be contrary to the public interest.

Aquatic Plant Control

The Chief of Engineers is authorized by the River and Harbor Act of 1965 to provide for control and progressive eradication of certain obnoxious aquatic plant growths. Local interests are required to pay 50 percent of the cost and to hold the Federal Government free from claims that may arise as a result of these operations.

Coastal Zone Management Planning

Changing national priorities, which have resulted in

increased State and local interest in management of the coastal zone, resulted in the Coastal Zone Management (CZM) Act of 1972. This Act declared national interest in the effective management, beneficial use, protection, and development of the coastal zone. It indicated that the primary responsibility for planning and regulation of land and water uses rests with state and local governments.

Although the Corps was not given a specific legislative assignment in the development of the state CZM plans, Section 307c(1) of the Act requires that:

"... each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum practicable extent, consistent with approved state management programs ..."

As such, the present Corps policy is as follows:

- Civil Works activities undertaken subsequent to approval of a State's CZM plan will be consistent with that plan to the maximum extent practicable.
- Permit applications for activities regulated by Corps authorities must include a certification that the action contemplated is consistent with the approved state CZM plan.
- Technical assistance requested by the state in their implementation of the national policy for CZM will be provided to the extent practicable.

In 1978, the Louisiana legislature passed a CZM bill covering land use in coastal parishes in Louisiana, from the Texas line to the Mississippi border and extending as far north as U.S. Highway 90. The Corps of Engineers continues to assist in the administration of the management program.

Special Programs

In addition to major water resources development projects authorized directly by Congress, the Corps of Engineers may accomplish small projects and emergency work. This work is performed under special programs established by Congress, with general funds appropriated annually.

Small Projects

Small Flood Control Projects (Section 205, Flood Control Act of 1948, as amended). Small flood control projects not specifically authorized by Congress may be constructed under authority given the Chief of Engineers. The Federal share in such projects may not exceed \$5,000,000. The work must be a complete solution to the flood problem involved so as not to commit the United States to additional improvements to ensure effective operation.

Small Navigation Projects (Section 107, 1960 River and Harbor Act, as amended). This legislation authorizes the Corps to construct small river and harbor improvement projects not specifically authorized by Congress. The Federal share in such projects may not exceed \$4,000,000. These projects must be complete and not commit the United States to any additional improvement to ensure successful operation. Such projects are also subject to the same requirements of feasibility and economic justification as the larger projects.

Small Beach Erosion Control Projects (Section 103, River and Harbor Act of 1962, as amended). Small beach restoration and protection projects not specifically authorized by Congress are constructed under this authority. The Federal share of the cost must not exceed \$2,000,000 for a single project, and the project must not be dependent on additional improvements for success.

Snagging and Clearing (Section 2, Flood Control Act of 1937, as amended by Section 208, 1954 Flood Control Act). The Corps is authorized under this act to spend up to \$500,000 on any tributary during one fiscal year in the interest of flood control. This work includes the removal of snags and other debris and the clearing and straightening of channels.

Emergency Work

Emergency Bank Protection (Section 14, Flood Control Act of 1946, as amended). This Small Project Act authorized the expenditure at a single locality of up to \$500,000 per year for repair, restoration, and modification of emergency streambank and shoreline protection to prevent damages to highways, bridge approaches, and other public works.

Flood and Coastal Storm Emergencies Rescue Work (PL 99, 84th Congress). This law authorized the Corps to engage in disaster preparedness, advance measures, flood fighting and rescue work, rehabilitation of flood control works damaged or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, provision of emergency drinking water, and drought assistance.

Snagging and Clearing (Section 3, River and Harbor Act of 1945 and Section 208, Flood Control Act of 1954). These Small Project Acts authorized emergency work by the Corps of Engineers to clear or remove unreasonable obstructions from rivers, harbors, and other waterways in the interest of navigation and flood control.

Disaster Relief and Assistance (PL 288, 93rd Congress). Such assistance includes making damage assessments, preparing damage survey reports,

performing emergency work essential for the preservation and protection of life and property, repairing and removing debris, providing technical and engineering services, and providing temporary housing for disaster victims.

Comprehensive Planning Cooperation (Section 22 of PL 93-251, Water Resources Development Act of 1974). This act authorizes the Secretary of the Army, acting through the Chief of Engineers, to cooperate with any state in the preparation of comprehensive plans for the development, utilization, and conservation of the water and related resources of drainage basins located within the boundaries of that state. He is also authorized to submit to Congress reports and recommendations for appropriate Federal participation. The Federal share in such plans is limited to \$300,000 annually in any one state.

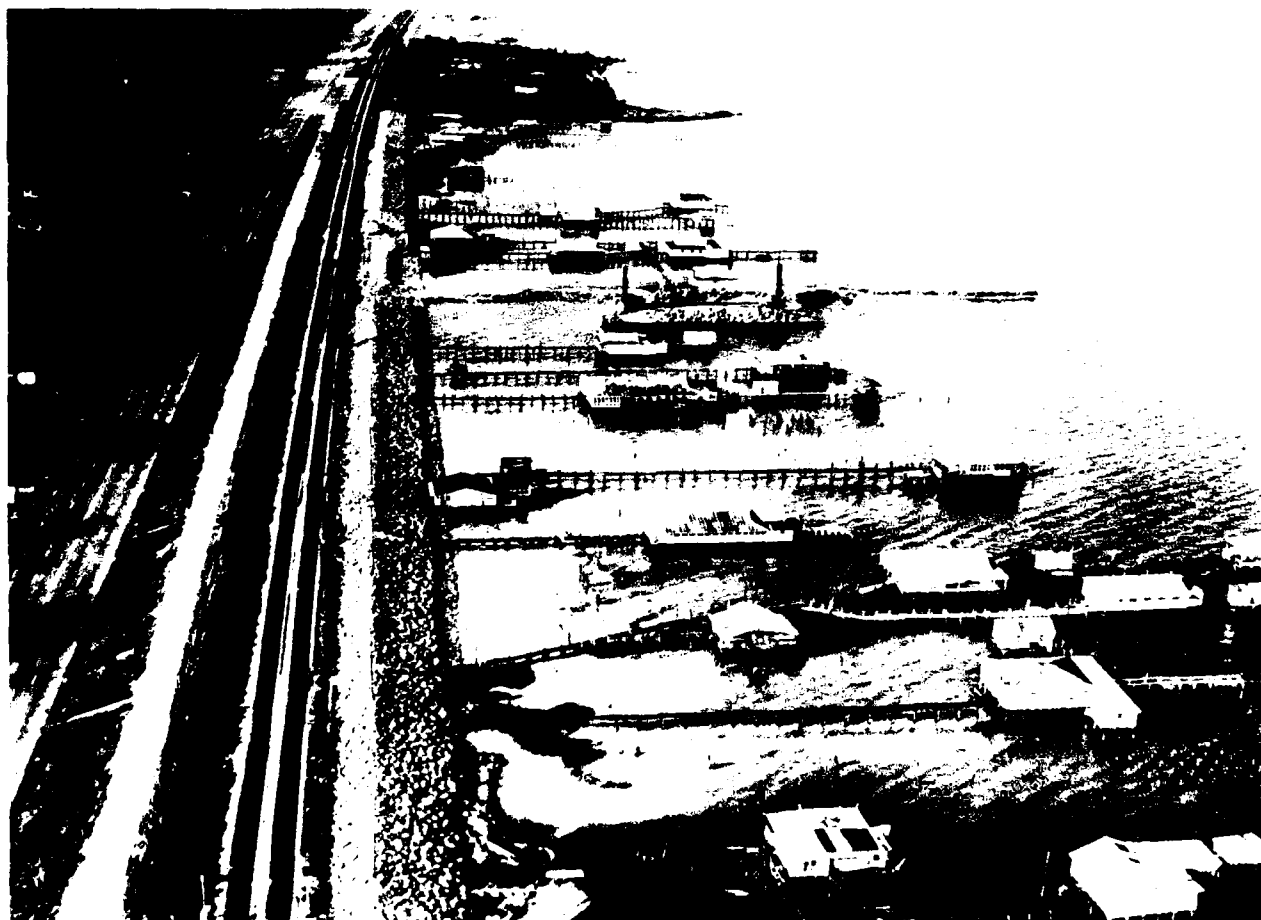
Shoreline Erosion Control Demonstration Act of 1974 (Section 54 of PL 93-251, Water Resources Development Act of 1974). This act provides for the establishment of a national shoreline erosion control development and demonstration program at specified areas and the establishment of a shoreline erosion

advisory panel. The program is to be conducted for a period of five fiscal years, with total appropriations not to exceed \$8,000,000. The program consists of planning, constructing, operating, evaluating, and demonstrating prototype shoreline erosion control devices, both engineered and vegetative. The demonstration projects emphasize the development of low-cost means to prevent and control shoreline erosion.

Technical and Engineering Assistance (Section 55 of PL 93-251, Water Resources Development Act of 1974). This act authorizes the Corps of Engineers to provide technical and engineering assistance to non-Federal public interests in developing structural and nonstructural methods to prevent damages caused by shore and streambank erosion.

Project Deauthorization

The Water Resources Development Act of 1986 established a procedure for deauthorization of projects that have been authorized for at least 10 years (Section 1001 of PL 99-662) and have not received Congressional appropriations within the last 10 years.



Lakefront foreshore protection dike at Citrus Lake

Mississippi River Basin

Introduction

The Mississippi River has made remarkable contributions to the physical and economic growth of the nation. When confined within banks this great river is a valuable asset. Uncontrolled, it would be a devastating liability. The Mississippi River and its tributaries drain an area of 1 1/4 million square miles in 31 states and two Canadian provinces. This area represents about 41 percent of the total land area of the contiguous United States.

The only outlets for the vast amount of water collected from the fourth largest drainage basin in the world are through the Lower Mississippi River formed by the junction of the Ohio and Upper Mississippi Rivers at Cairo, Illinois, and through the Red-Atchafalaya

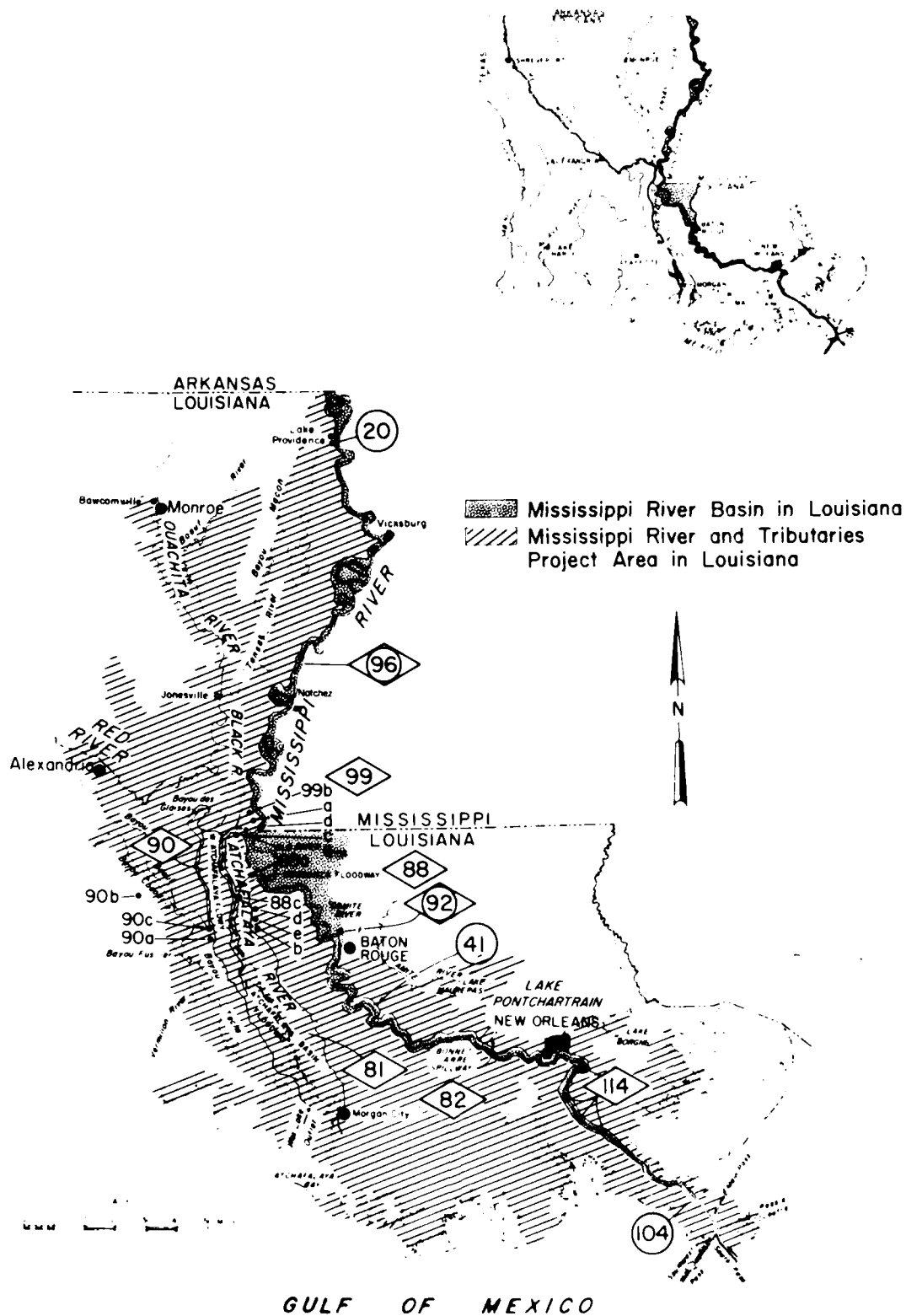
Rivers. The problem, then, is to make best use of and protect against the water that drains through the Mississippi River Basin.

Prior to authorization of the existing project, the largest flood of record on the Mississippi River occurred in 1927. Major floods occurring since then include those of 1929, 1932, 1935, 1937, 1945, 1950, 1973, 1975, 1979, 1983, and 1984.

Without man-made protection works, about 35,000 square miles in the alluvial valley would be flooded by the occurrence of the project flood, which is somewhat larger than the largest flood of record and is used as a model in designing protective works.



Lower Atchafalaya River overlooking Morgan City to Bateman Island to Atchafalaya Bay



Mississippi River Basin

Mississippi River Basin

PROJECTS



NAVIGATION

- 20 Lake Providence Harbor
- 41 Mississippi River, Baton Rouge to Gulf of Mexico
- 104 Mississippi River Outlets, Venice



FLOOD CONTROL - MISSISSIPPI RIVER AND TRIBUTARIES

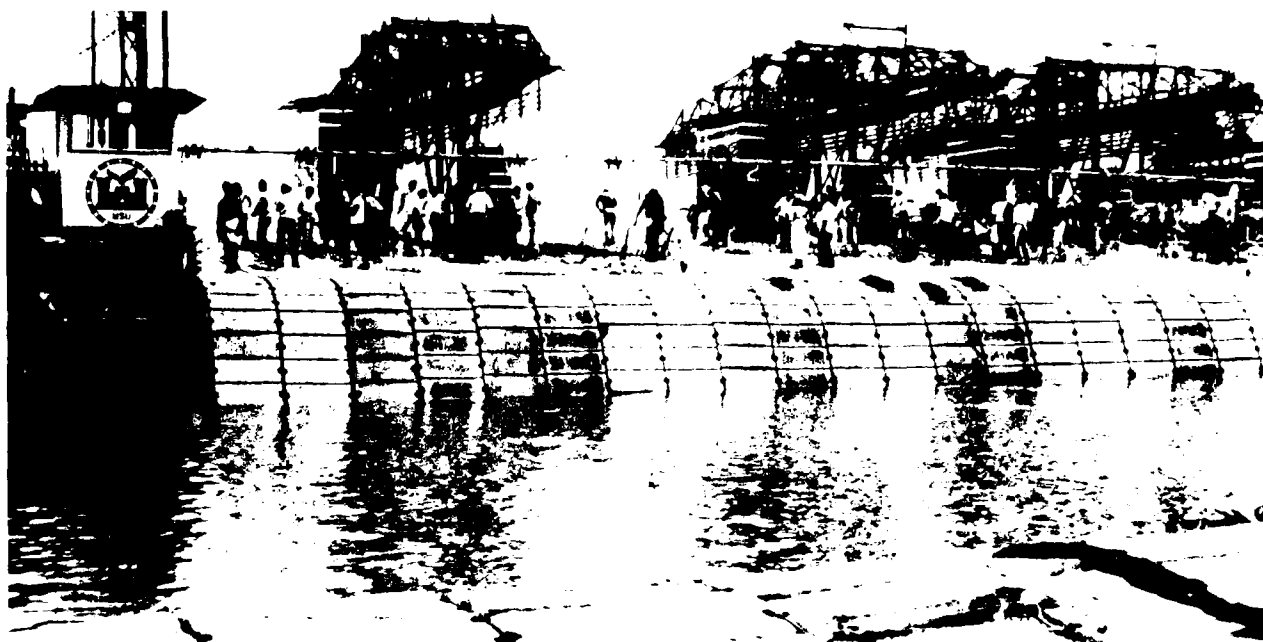
- 81 Atchafalaya Basin Floodway
- 82 Bonnet Carre' Spillway and Floodway
- 88 Morganza Floodway
 - a. Morganza Combined Control Structure
 - b. New Orleans, Texas and Mexico Railway High-Level Crossing
 - c. Pointe Coupee Drainage Structure and Bayou Latenache
 - d. Texas and Pacific Railway High-Level Crossing
 - e. U.S. Highway 190 High-Level Crossing
- 90 West Atchafalaya Floodway
 - a. New Orleans, Texas and Mexico Railway High-Level Crossing
 - b. Opelousas - Ville Platte - Bunkie Railway Connection
 - c. U.S. Highway 190 High-Level Crossing
- 99 Old River
 - a. Low-Sill Control Structure
 - b. Overbank Control Structure
 - c. Old River Navigation Lock
 - d. Levee from Blackhawk to Torras
 - e. Auxiliary Structure

- 114 Mississippi Delta Region



NAVIGATION AND FLOOD CONTROL - MISSISSIPPI RIVER AND TRIBUTARIES

- 92 Baton Rouge Harbor - Devil's Swamp
- 96 Mississippi River, Cairo, Illinois to Baton Rouge, Louisiana



Mat-sinking plant on Mississippi River

Mississippi River And Tributaries Alluvial Valley

Alluvial Valley

Since 1804, the U.S. Army Corps of Engineers has played a constantly increasing role in adapting the alluvial valley to the requirements of man. The Corps has been charged with opening the streams to commerce, protecting farmlands and cities from flood, and cleaning up the ruin after storms.

Except for backwater areas and floodways, the alluvial valley is a highly developed agricultural and industrial region. The agricultural development is widely dispersed. The major industrial developments are measured in billions of dollars, and are concentrated near the urban centers, particularly along the river below Baton Rouge.

After the disastrous flood of 1927, Congress authorized a comprehensive plan for flood control in the Mississippi River Alluvial Valley by passage of the Flood Control Act of May 1928. This act has been modified many times, the latest modification being by the Water Resources Development Act of 1986.

The Mississippi River and Tributaries (MR&T) project provides for flood protection of the alluvial valley of the Mississippi River between the Head of Passes, Louisiana, and Cape Girardeau, Missouri. Because of the wide expanse covered by the project and the complex problems involved, no single improvement could afford protection against all floods.

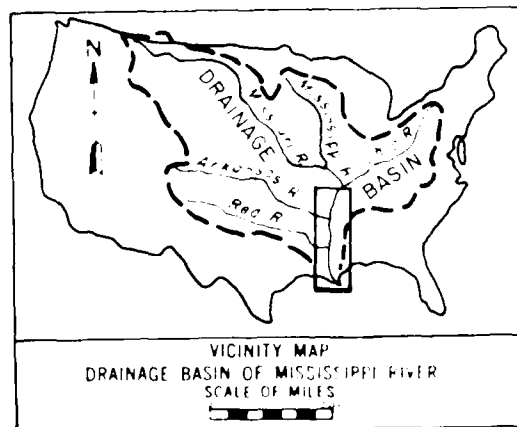
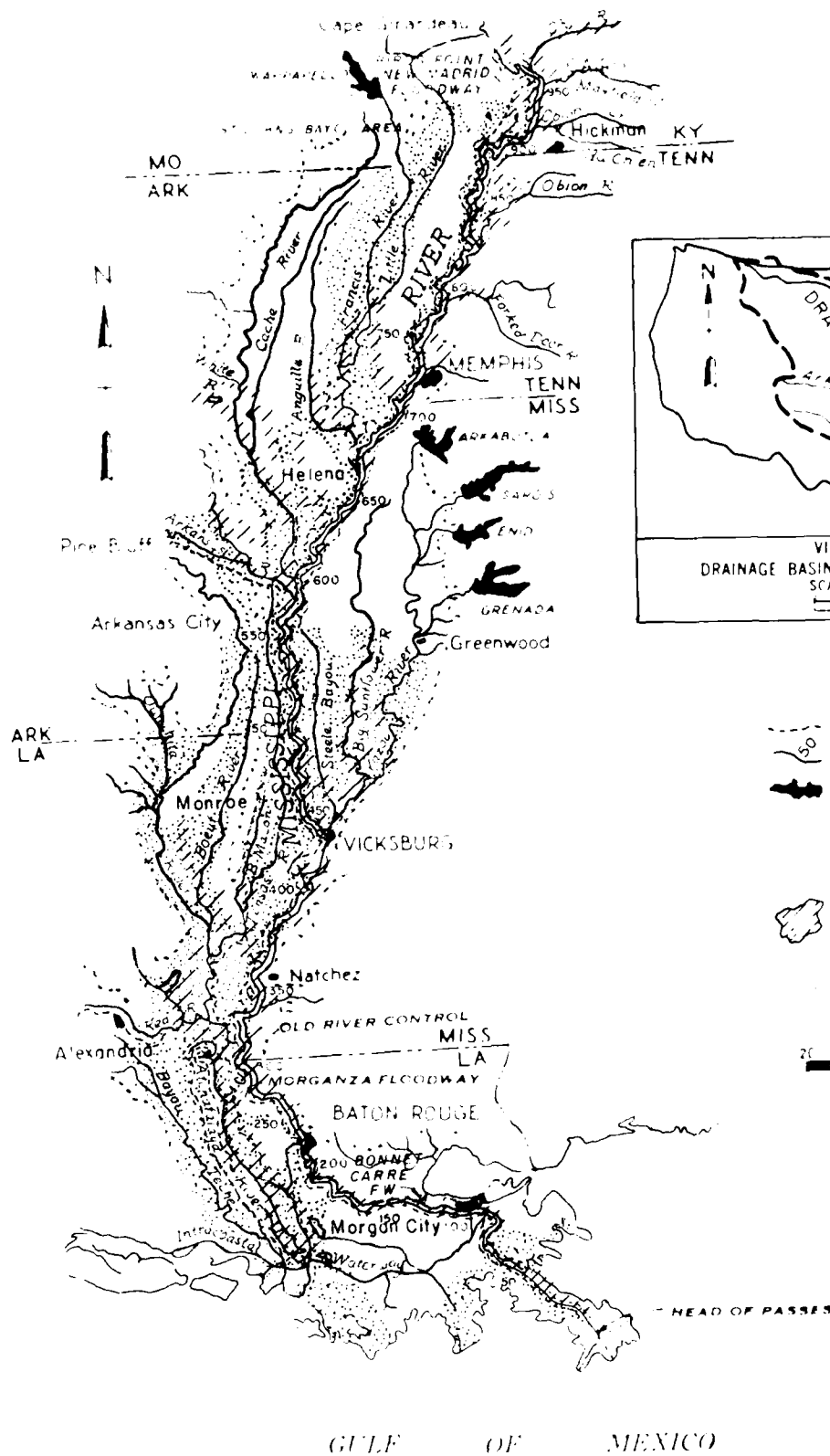
The existing project contains a combination of features, such as levees along the main stem of the river and its tributaries in the alluvial plain to confine the

floodflow; reservoirs on the tributary streams to hold back peak flows; floodways to receive excess flow from the river; and channel improvement such as revetment, dikes, and dredging to increase channel capacity. There are other features—control structures, cutoffs, pumping plants, floodwalls, and floodgates.

Since 1927, floods from the Mississippi River in Louisiana have been confined within levees without overtopping. However, high stages in the unprotected backwater areas continue to cause considerable damage.

In addition to the flood control features, the MR&T project also provides for construction and maintenance of a navigable channel from Baton Rouge to Cairo. The Lower Mississippi, the main stem of about 10,000 miles of natural and man-made waterways with navigable depths of 6 feet or more, is of vital importance to the nation's transportation system.

The Mississippi River Commission, under the direction of the Secretary of the Army and supervision of the Chief of Engineers, is responsible for accomplishment of work on this project. The Commission was created by Congress in 1879. The total authorized cost of the project, including all modifications, is over \$9.4 billion, of which about \$4.1 billion has been spent to date. Recent cost of annual maintenance is \$100 million. Accumulated benefits of the existing project from its inauguration in 1928 to date amount to more than \$217 billion.

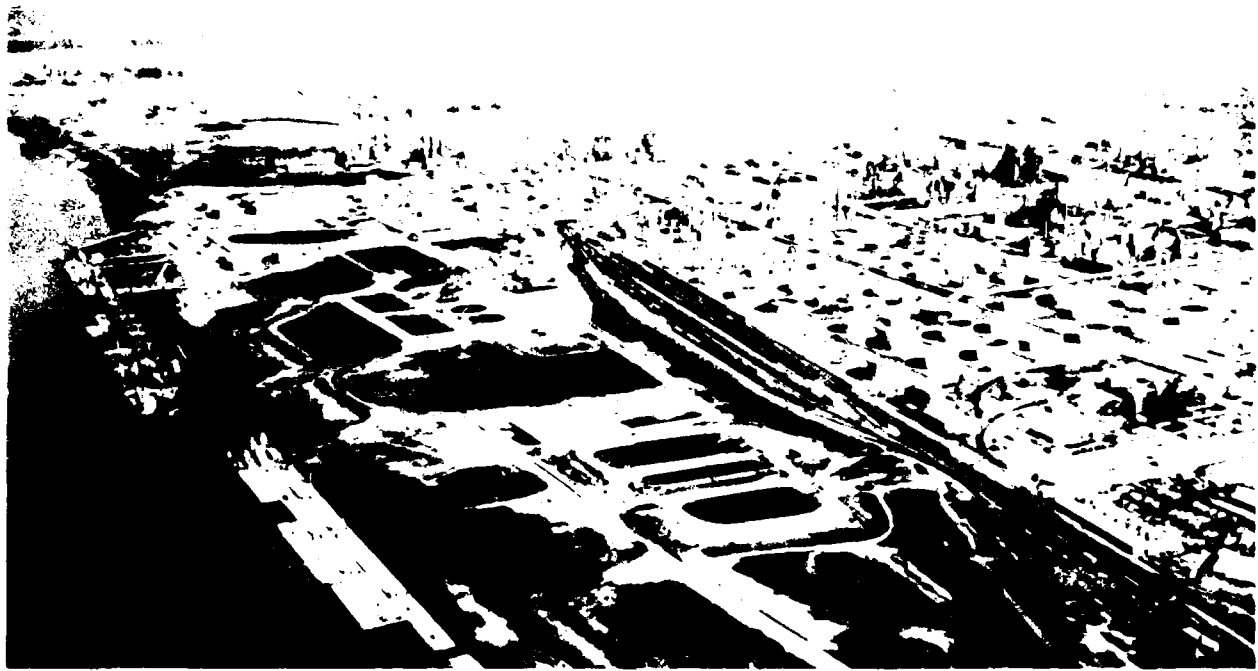


LEGEND

- Existing Project Levee.
- Miles above Head of Passes
- Flood Control Reservoir.
- Alluvial Valley Formerly Subject to Overflow.
- Floodway Channels and Backwater Areas Remaining Subject to Overflow.
- Area Flooded 1927.



ALLUVIAL VALLEY OF THE MISSISSIPPI RIVER



Oil refinery on Mississippi River at Baton Rouge

The MR&I project is extensive in scope and involves a number of tributary basins. The features of the MR&I project located within the Louisiana portion of the Mississippi River Basin are discussed within this section.

Levees—Main Line

(Mississippi River Commission)

The levees within the Lower Mississippi River Valley are considered as one project. Obviously, levees that protect any one area also influence the degree of protection afforded downstream areas.

The main stem levee system consists of 2,202 miles, of which 1,609 have been completed to design grade and section.

There are 1,608 miles of levees and floodwalls now authorized along the Mississippi River below Cape Girardeau, Missouri.

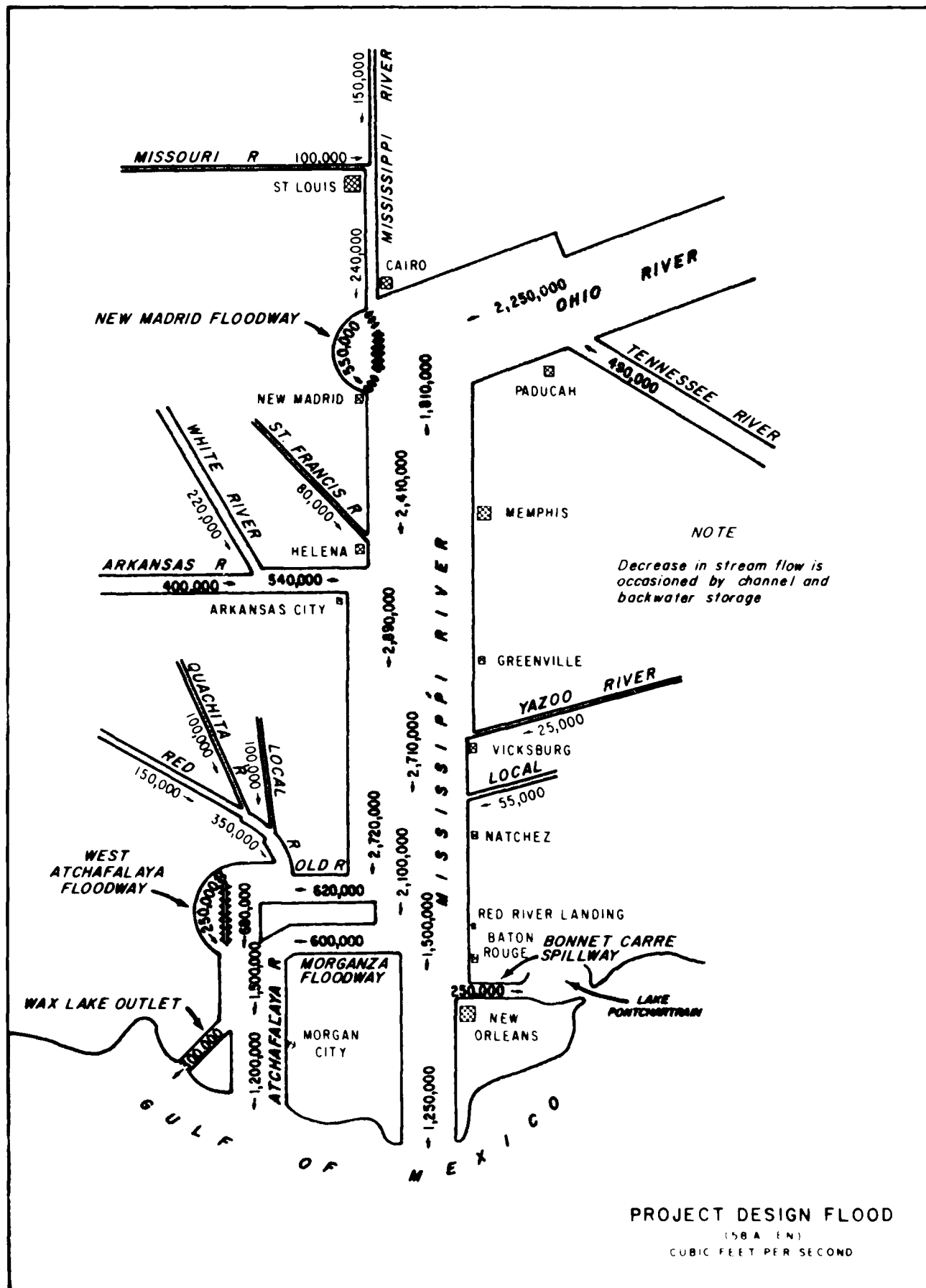
Additional levees and structures included in the main stem levee system are those along the south bank of Arkansas River (85.4 miles); along the south bank of the Red River (59.2 miles); and 449.2 miles in the Atchafalaya River Basin. Graveled or hard-surfaced roads have been constructed on 1,800.5 miles of the levee system.

Below Baton Rouge, in the New Orleans District, about 134 miles of levee are protected against river wave wash by levee-slope pavement. Foreshore protection works extend along 93 miles of levee. Additional work in progress includes enlargement of levee sections, construction of riverside and landside

berms, construction of wave-wash protection, provision of seepage control measures, and construction of concrete floodwalls in highly urbanized areas.

On the west bank the levee line begins just south of Cape Girardeau, Missouri, and except for gaps where tributaries join the Mississippi, extends unbroken to Venice, Louisiana, near the Gulf of Mexico. The longest continuous levee line in the MR&I project, and probably in the world, begins at high ground near Pine Bluff, Arkansas, follows the south bank of the Arkansas River to its mouth, and continues down the Mississippi River to its terminus in the vicinity of Venice, a distance of more than 650 miles. There are Corps of Engineers navigation locks through the levee line at Old River, Port Allen, Harvey, Algiers, and a state-owned lock at Empire, Louisiana. There are additional openings at the Old River Low-Sill, Auxiliary and Overbank Structures, the Morganza Control Structure, and the Bonnet Carré Spillway.

The west bank levees were considered adequate prior to 1973. During the 1973 flood it became evident that portions of the levee were inadequate based on a new project flow line developed from data generated by the flood. It was determined that 192.8 miles of main-line levee, between the Arkansas-Louisiana state line and a point near Black Hawk, Louisiana, needed to be raised to the revised standards. Work was initiated in fiscal year 1974 to bring the levees up to the revised standards. Costs for the 172 miles of levee-raising work in Louisiana are estimated at \$183 million.





Levee repair work and mat sinking, Mississippi River near Marrero

The east bank is, except for backwater areas, protected by levees alternating with high bluffs.

Continuations of the main-line levees extend up the north bank of the Ohio River to high ground near Mound City, Illinois; the north bank of White River to Old Town Lake, Arkansas; and the south bank of Arkansas River to Pine Bluff.

Levees authorized under provisions of Section 6, 1928 Act, include 129.4 miles of levee along the banks of the Mississippi River between Cape Girardeau, Missouri, and Rock Island, Illinois, and 306.2 miles along tributaries within the limits of the Mississippi River backwater. These include 20.7 miles along the Red River and 68.5 miles on the east bank of the Ouachita River.

The main-line Mississippi River levee system in Louisiana is 710 miles in length.

Channel Improvement (Mississippi River Commission)

Channel improvement in the interest of both navigation and protection of flood control works in the lower alluvial valley below Cairo, Illinois, is an integral part of the Mississippi River project. The project, authorized by the Flood Control Act of May 1928 and subsequent amendments, provides for stabilization of the channel by means of revetment, dikes, and dredging.

Revetment and Foreshore Protection. Bank stabilization is important for flood control and navigation and the protection of existing industrial facilities located along the river below Cairo. On the Mississippi River, it is flexible in scope and application.

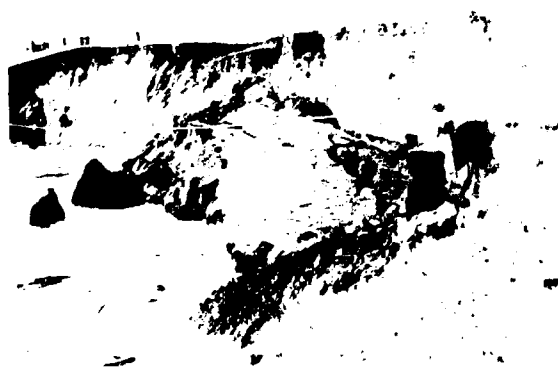
The best means of protecting banks from erosion and maintaining the integrity of an articulated concrete mattress, and water and riprap above the waterline. Operating in the lower valley, between Cairo and Head of Passes, there are 1,875 miles of bank of which 350 miles are in Louisiana. This construction of 168 miles of fo-

shore protection is also authorized under this project. One hundred miles of this work have been completed in Louisiana.

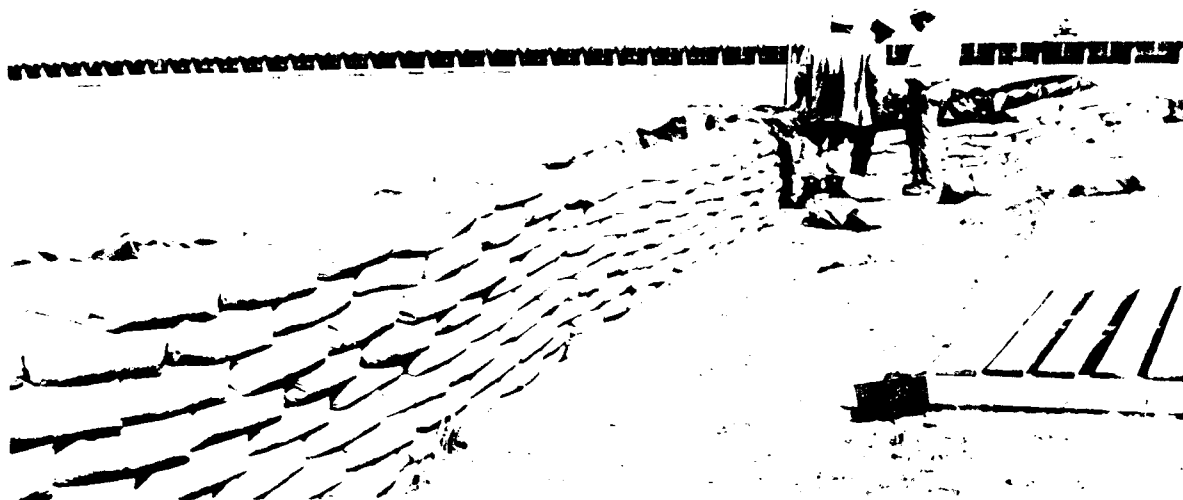
Dikes and Dredging. In the 725-mile reach of the Mississippi River between Cairo, Illinois, and Baton Rouge, Louisiana, a low-water navigation channel 9 feet deep and 300 feet wide is maintained by dredging and training works.

This work includes channel contraction by dikes, realignment by dredging, and closure of secondary channels, as required. On 31 December 1986, there were 215 miles of operative dikes on the Mississippi River between Cairo and Baton Rouge.

In carrying out an authorized channel improvement program between Cairo and Baton Rouge, 16 cutoffs were developed between 1933 and 1942. These, combined with chute channel development and alignment improvements, decreased channel length between these cities by about 170 miles. However, current velocities increased the attack on the banks, and the river began to regain its length. As a result, the net shortening between 1933 and 1962 was 114 miles of the theoretical 170-mile cutoff.



Mississippi River levee failure in August 1985 near Marrero



Cement bags used in flood control tests at Bonnet Carré Spillway

Off-Main-Stem Flood Control (Mississippi River Commission)

Supplementary improvements for local protection have been built in those portions of the lower alluvial valley located in the basins of St. Francis and Little Rivers in Missouri and Arkansas; at Cairo, Illinois, and vicinity; along east bank tributaries in western Kentucky and Tennessee; in the lower White and Arkansas River Basins in Arkansas; in the Tensas River Basin in Arkansas and Louisiana; in the Atchafalaya Basin in Louisiana; and in the Yazoo Basin in Mississippi.

Floodways and Outlets (Mississippi River Commission)

Three major supplementary flood outlets are designed to pass one-half of the project floodflows from the Mississippi River channel to the Gulf of Mexico. The Bonnet Carré Spillway, located on the east bank about 33 river miles above Canal Street in New Orleans, is capable of passing a flow of 250,000 cubic feet per second into Lake Pontchartrain and thence to the Gulf. The Morganza Floodway, located on the west bank about 50 river miles above Baton Rouge, is capable of passing a flow of 600,000 cubic feet per second into the Atchafalaya Floodway and thence to the Gulf. The Old River project, located about 80 river miles above Baton Rouge, is capable of passing a flow of 620,000 cubic feet per second into the Atchafalaya Floodway and thence to the Gulf (see Project Design Flood diagram).

Bonnet Carré Spillway (New Orleans District). Residents in the area consider Bonnet Carré Spillway in St. Charles Parish a pleasant place to picnic, camp, and hunt. But the purpose for which it was built is of far greater importance. The spillway is an integral part of the comprehensive plan for flood control in the Mississippi Valley. It serves to ensure the safety of New Orleans and the downstream delta area during major floods on the Lower Mississippi.

The project, which was completed in 1936, at a cost of \$14,212,200, is designed to introduce floodwaters from the Mississippi to Lake Pontchartrain to prevent overtopping of levees at and below New Orleans.

Situated between the Mississippi River and Lake Pontchartrain some 33 river miles above New Orleans, the project consists of a reinforced concrete control structure located in the riverbank and guide levees extending about 5.7 miles from the river to the lake. These levees, averaging about 19 feet in height, form a floodway flaring from 7,700 feet in width at the river end to about 12,400 feet some 3.5 miles from the river, beyond which point the width is constant to the lake.

The structure consists of 350 individual bays for controlling the flow. Each bay is 20 feet wide and is equipped with movable timber needles, 8 by 11½ inches in cross section. In 174 bays, the weir crest is at elevation 15.35 feet National Geodetic Vertical Datum (NGVD)*; in the remaining bays, it is 2 feet higher. The timber needles are set in place and removed by two operating cranes which ride on a service bridge crossing the control structure.

The spillway and floodway have a design capacity of 250,000 cubic feet per second and are operated to prohibit the discharge at Carrollton (located near river mile 104) from exceeding 1,250,000 cubic feet per second.

The spillway is crossed by the Yazoo and Mississippi Valley Railroad, the Kansas City Southern Railway, and the Illinois Central Railroad, a roadbeds of which

*National Geodetic Vertical Datum (NGVD) is based on mean sea level for the years 1929-1982.



Revetment at English Turn on Mississippi River

are on timber trestles. U.S. Highway 61 (Airline Highway) and Interstate Highway 10 cross the spillway on reinforced concrete bridges.

Revenue is realized through the lease of approximately 3,700 acres of project lands and mineral rights. Material deposited during operation of the spillway provides a convenient source of high-grade fill material which has been used extensively in highway and heavy construction projects in the surrounding area. This use has operated to preserve the flow capacity of the spillway.

Approximately 250,000 visitors annually enjoy the outdoor recreational opportunities offered by the spillway. Also, two licenses have been granted for recreational development of each guide levee, one to the St. Charles Parish Police Jury and the other to the Pontchartrain Levee District. At the levee district site, a two-lane concrete launch ramp and improvements for camping and picnicking have been completed. Plans for additional facilities are proposed.

The spillway was completed in 1936 and has served its intended function on seven occasions—in 1937, 1945, 1950, 1973, 1975, 1979, and 1983.

Morganza Floodway (New Orleans District). Located on the west side of the Mississippi River some 35 miles northwest of Baton Rouge, the Morganza Floodway is capable of introducing excess floodwaters from the Mississippi River to the Atchafalaya Basin Floodway at a rate of 600,000 cubic feet per second (4.5 million gallons per second). The structure was operated for the first and only time when a partial opening was made

during the 1973 flood to lower Mississippi River stages and relieve pressure on the Old River Low-Sill Control Structure.

The floodway consists of a combined gated-control structure about 20 miles to the south, high-level highway and railroad crossings over the floodway, and drainage alterations and improvements.

Comprehensive easements for full use of the lands within the floodway have been acquired between the guide levees. Habitation within the floodway is not permitted, but use of the land for farming, removal of timber and minerals, and other purposes not in conflict with flood control are permitted with prior approval.

The land and water areas around the control structure are used extensively for fishing and picnicking.

Descriptions of the various features comprising the floodway follow:

- **Morganza Combined Control Structure.** The structure consists of about 19,340 linear feet of levee and a reinforced-concrete structure consisting of 125 gated openings, each 28 feet 3 inches wide, separated by 3-foot-wide piers. Each opening is equipped with a steel vertical-lift gate operated by a gantry crane. Bridges for the gantry crane, Louisiana Highway 1 (old No. 30), and the joint track for the Kansas City Southern and Texas and Pacific Railways are supported by piers between the earth embankments flanking the control structure. The structure was completed in 1954 at a cost of \$20,680,000.
- **Morganza Floodway Levees.** The levees consist of

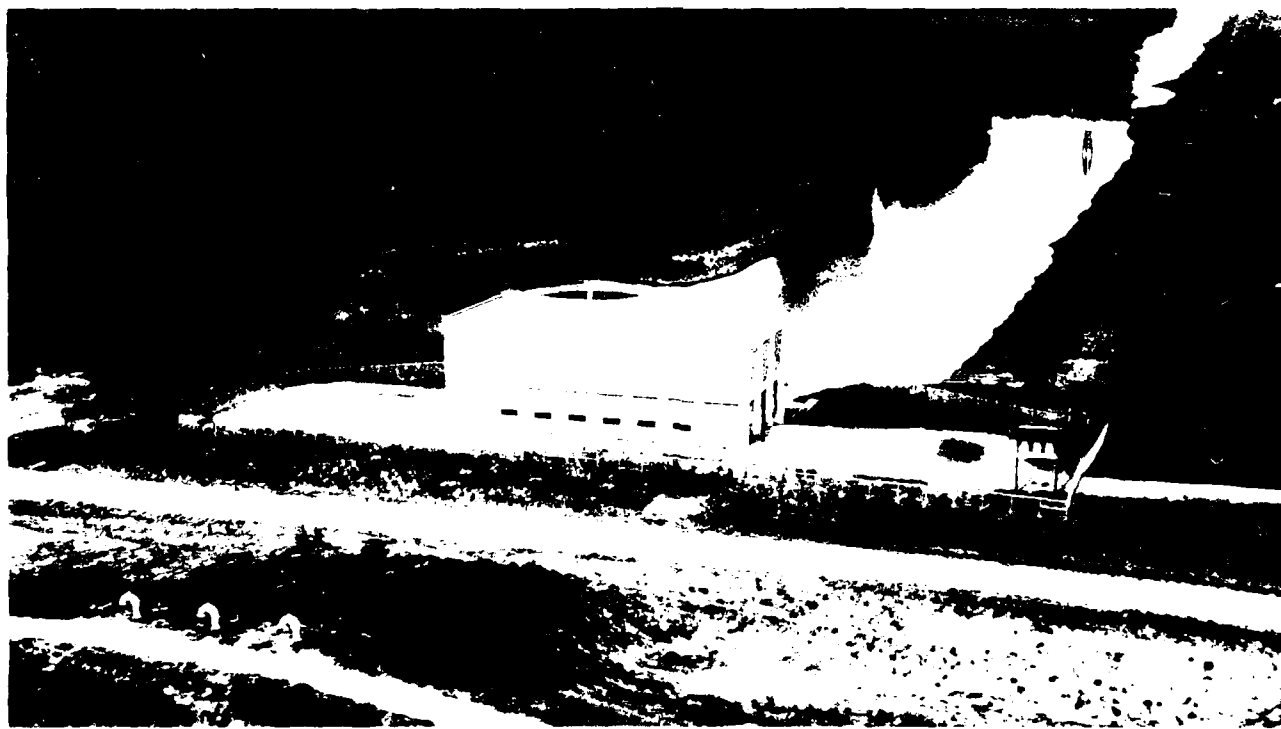
the upper and lower guide levees which, with the East Atchafalaya River levee, form a floodway averaging about 5 miles in width. The upper guide levee extends about 9 miles southwesterly from the combined control structure to the East Atchafalaya River levee, about 2 miles upstream from Melville. This levee protects more than 100 square miles of productive farmlands in upper Pointe Coupee Parish from overflow during floodway operations. The lower guide levee extends about 19.4 miles in a southerly direction from the control structure to join the East Atchafalaya Basin protection levee at the latitude of Krotz Springs.

- **Pointe Coupee Drainage Structure and Bayou Latenache.** A drainage system for the Upper Pointe Coupee Parish area, which is protected by the upper guide levee, was provided with a drainage structure at the intersection of the levee and Bayou Latenache. The bayou was enlarged from the drainage structure to U.S. Highway 190. The structure, located about 0.5 mile east of the Atchafalaya River, consists of a reinforced-concrete structure supported on untreated timber piles and contains two motor-operated steel lift gates, each 10.5 feet wide and 15.0 feet high. This feature was completed in 1942 at a cost of \$310,000. Operation and maintenance are the responsibility of the U. S. Army Corps of Engineers.

Inundation rights have been acquired on 12,800 acres of land above the drainage structure for storage of runoff during the closure of the gates, for operation of the Morganza Floodway.

Additional drainage work has been authorized for the upper Pointe Coupee area. Initially, improvements included the enlargement of Bayou Latenache, a Corps of Engineers responsibility, and construction of an interior drainage system of major laterals and on-farm drains by others.

Pointe Coupee Pumping Station was designed and constructed as a result of initial area drainage studies and restudies conducted prior to and following the 1973 flood. This pumping station was constructed in lieu of enlarging Bayou Latenache, as initially planned. Construction began in 1980 and was completed in October of 1983; the station was first operated for removal of floodwater from the upper Pointe Coupee loop area in December of 1983. The station floodwater pumping system consists of three diesel engine driven 500 cubic feet per second pumps that are instrumental in progressively activating pumps as needed to limit floodwater accumulations at the pumping plant to 27.5 feet NGVD, with progressive deactivation as levels are drawn down. The station structure is reinforced-concrete set on driven steel piling. The station discharge is into the Atchafalaya River through three 84-inch-diameter pipes over the East Atchafalaya River, about 0.2 mile north northwest of the Pointe Coupee Drainage Structure. This \$15,000,000 station is expected to minimize the duration of flooding in this leveed loop area and ensure larger crop acreage availability.



Pointe Coupee Pumping Station

- **High-Level Crossings.** A 39,000-foot, single-track, high-level crossing for the Texas and Pacific Railway main line was constructed between McKittrick and Red Cross. Consisting of two reinforced-concrete deck girder trestles, 6,000 and 10,000 feet in length, and earth embankment sections, this feature was completed in 1950 at a cost of \$6,500,000.

A similar high-level crossing for the New Orleans, Texas, and Mexico Railway was completed in 1944 between Lottie and East Krotz Springs. It consists of 18,750 linear feet of trestle and 8,350 linear feet of embankment. The cost was \$3,300,000. This crossing will be used by other railroads during interruptions caused by operation of the West Atchafalaya Floodway (below). In 1945, a high-level crossing for U. S. Highway 190 was completed between Lottie and East Krotz Springs at a cost of \$4,670,000. This crossing consists of 8,609 feet of paved embankment and 18,778 linear feet of reinforced-concrete trestle.

The railway companies and the Louisiana State Highway Department are responsible for operation and maintenance of the railway and highway crossings, respectively.

West Atchafalaya Floodway (New Orleans District).

Under the project plan, it is estimated that this floodway, which has a designed capacity of 250,000 cubic feet per second, will be used on an average of once every 100 years for carrying floodwaters in excess of the combined capacities of the Atchafalaya and Mississippi Rivers and the Morganza Floodway. The floodwaters will enter the floodway by overtopping the levee at the head of the floodway and along the south bank of Bayou des Glaives. The floodway has not been operated to date.

The floodway, about 6 miles in width, is located between the West Atchafalaya River levee and the West Atchafalaya Basin protection levee. It extends from Bayou des Glaives to the latitude of Krotz Springs, a distance of about 32 miles. Below this point, it joins the floodwaters from the Atchafalaya River and the Morganza Floodway in the Atchafalaya Basin Floodway.

Perpetual flowage easements were acquired by the Government over all lands and improvements in the floodway down to the latitude of Krotz Springs. These easements provide for full use of the lands for flood control purposes. Owners retain the rights to farm, improve, and inhabit the lands, and to harvest timber and minerals.

Railway and highway traffic is carried over the floodway on high-level crossings described subsequently.

- **New Orleans, Texas, and Mexico Railway.** The high-level crossing between Krotz Springs and Courtableau provides means by which uninterrupted traffic can be maintained by the New Orleans, Texas, and Mexico Railroad, the Texas and Pacific Railway, the Missouri Pacific Railroad, and the

Kansas City Southern Railway across the floodway during the floods requiring operation of the West Atchafalaya Floodway. The detoured traffic will regain its own route by use of the Opelousas-Ville Platte-Bunkie Railway connection, described below. The single-track, high-level crossing comprises 31,466 linear feet of earth embankment and 7,500 linear feet of reinforced-concrete-ballast deck-type trestle supported on piling. It was completed in 1961, at a cost of \$6,547,000. The railroad companies are responsible for maintenance.

- **Opelousas-Ville Platte-Bunkie Railway Connection.** Located west of the West Atchafalaya Floodway between Opelousas and Bunkie, this connection was constructed in lieu of providing two additional high-level crossings over the West Atchafalaya Floodway for the Texas and Pacific and the Kansas City Southern Railways. The connection included construction of 16 miles of new single-track railroad between Opelousas and Ville Platte and the rehabilitation and strengthening of about 20 miles of single-track railroad between Ville Platte and Bunkie. Construction was completed in 1950, at a cost of \$820,000. Maintenance is the responsibility of the railroad companies.
- **U. S. Highway 190.** The high-level crossing between Krotz Springs and Courtableau consists of an elevated 4-lane, twin-bridge highway, averaging about 29 feet above ground level, and comprising 29,385 linear feet of earth embankment and 7,500 linear feet of reinforced-concrete bridge supported by piling. During operation of the floodway this crossing will provide an east-west highway route across the Atchafalaya Basin. Other usable routes include Interstate 10, about 15 miles to the south; U. S. Highway 90 through Morgan City, 60 miles to the south; and U. S. Highway 84 through Natchez, Mississippi, 74 miles to the north. Construction was started in 1956, and the crossing was opened to traffic in 1965. Cost was \$8,385,900. The Louisiana Highway Department is responsible for maintenance.

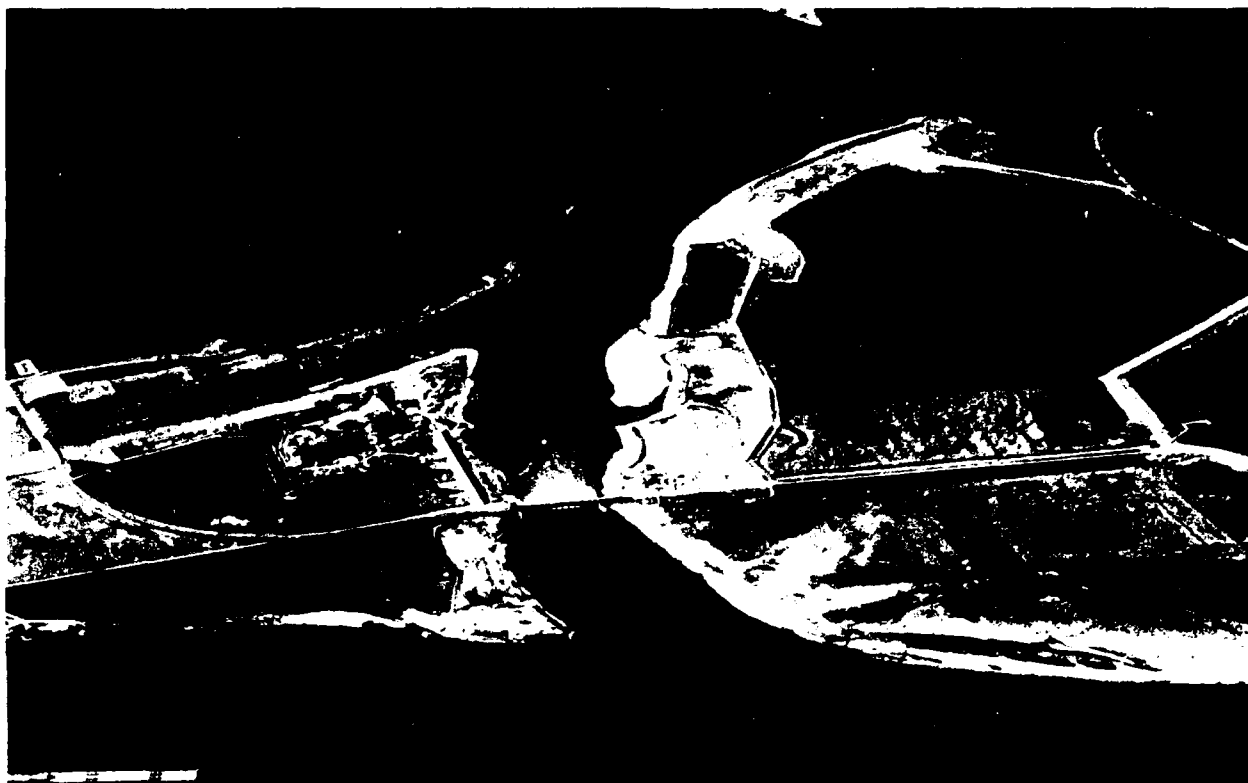
Atchafalaya Basin Floodway (New Orleans District).

The floodway is located between protection levees approximately 15 miles apart, extending from the lower limits of the Morganza and West Atchafalaya Floodways, at the latitude of Krotz Springs, to Morgan City and through the Lower Atchafalaya River and Wax Lake Outlet, to the Gulf of Mexico. The improvements necessary to this floodway are described as separate features.

Old River

(New Orleans District)

Prior to construction of the Old River control project, the Mississippi and Atchafalaya Rivers were linked by an uncontrolled natural channel known as Old River. Studies by the Mississippi River Commission indicated that the Mississippi River was seeking to use this natural link to change its course to that of the Old and



Old River Control Structure

Atchafalaya Rivers. In the absence of any intervention by man, the studies show that such a change could have taken place between 1965 and 1975. If this had occurred, the cities of Baton Rouge and New Orleans and many lesser size communities would have been without sufficient quantities of fresh water to satisfy domestic needs during low-water periods. The vast industrial complex located from Baton Rouge to near the mouth of the river would have been without the fresh water vital to its operation. The Mississippi River as far upstream as Baton Rouge would have become brackish.

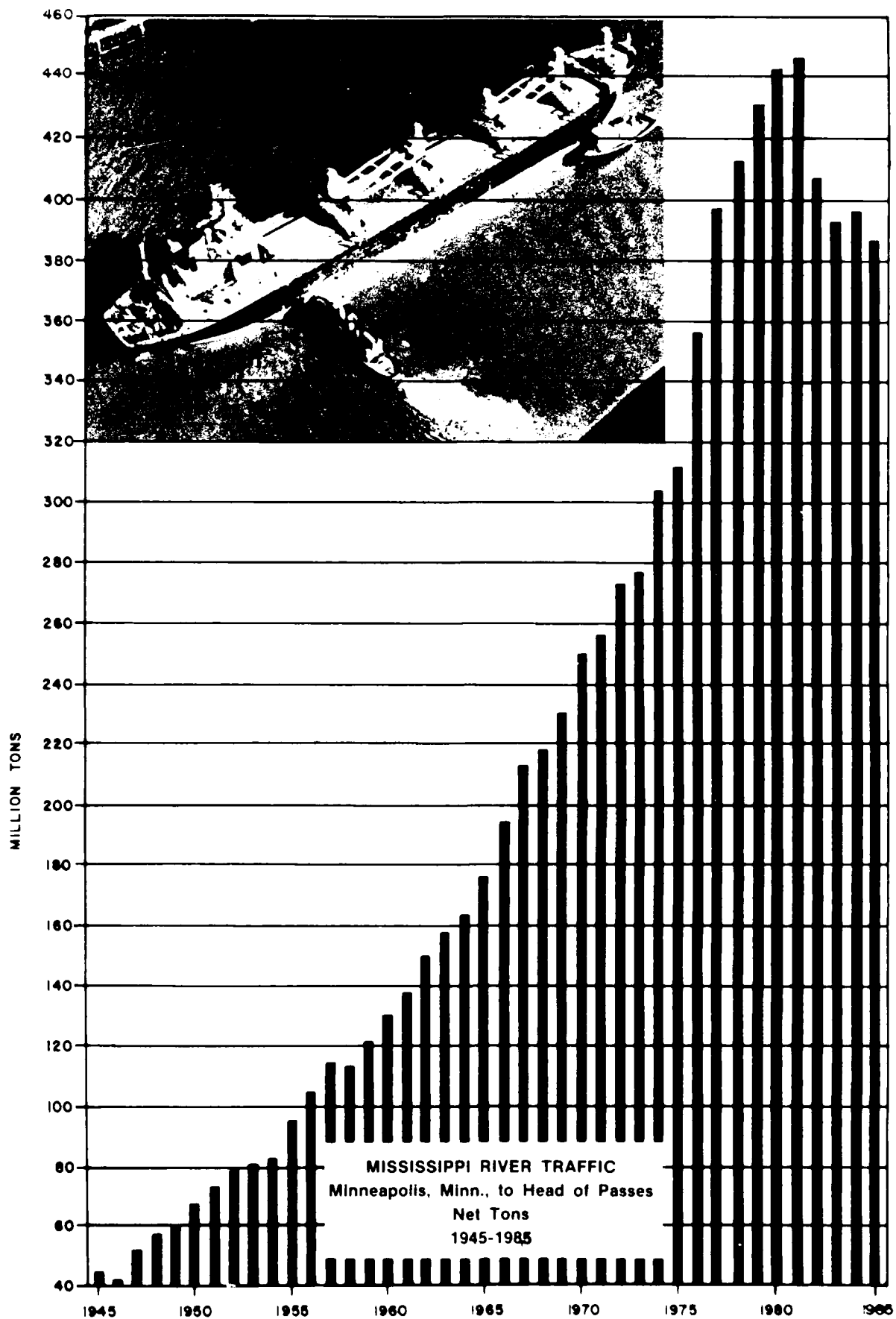
Cities, towns, railroads, highways, waterways, industry, agriculture, and utilities in the Atchafalaya Basin would have been subject to serious disruption. The effect would have probably been felt as far upstream as Vicksburg on the Mississippi River and Boyce on the Red River as a result of swifter currents and increased meandering. The investment of the United States in flood control and navigation works would have been threatened, and a large amount of it lost. The plan for confining floods below Old River would have had to be redesigned and reconstructed.

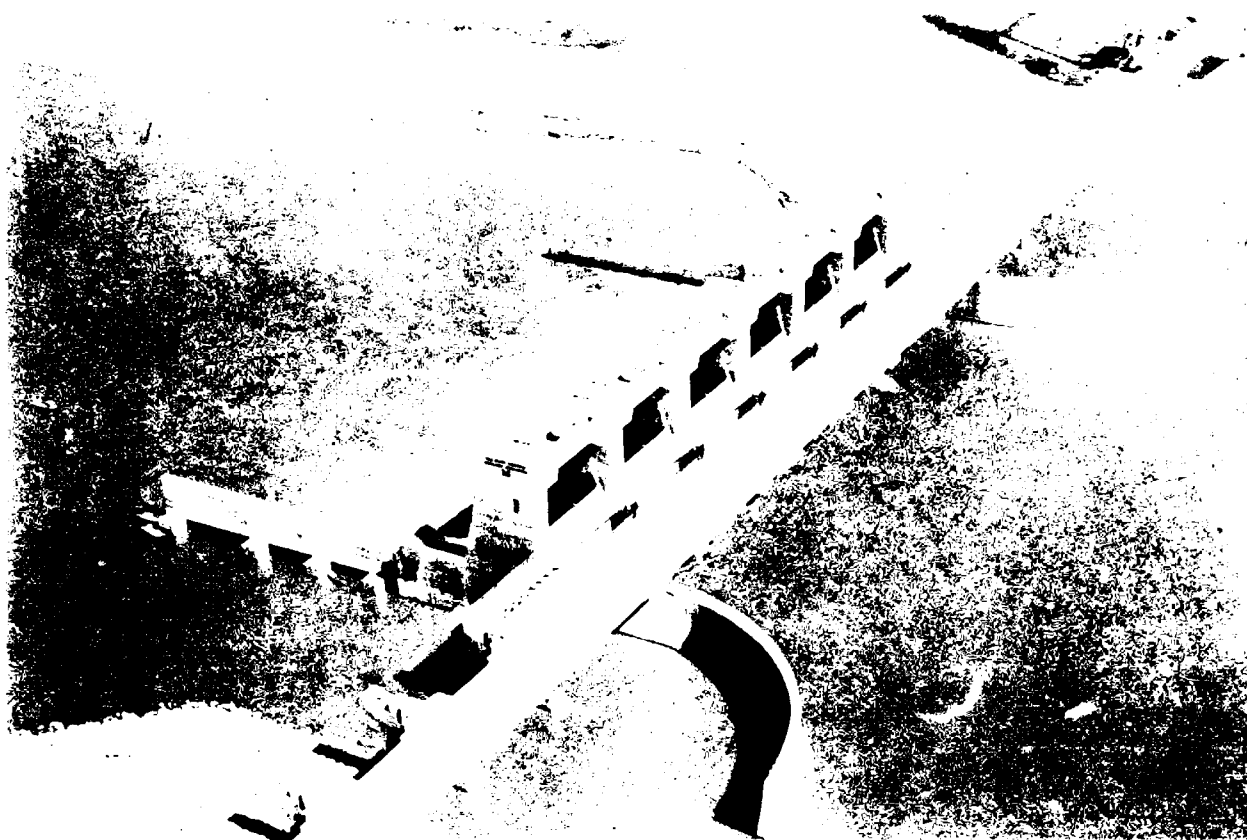
The cost associated with providing the necessary flood protection against captured flows of the Mississippi River down the Old and Atchafalaya Rivers is estimated to be close to \$2.4 billion.

In order to preserve the present course of the river, a project was authorized by PL 780, 83rd Congress, approved in September 1954 (a modification of the

Flood Control Act of May 1928), to maintain the balance of flows from the Mississippi River into the Atchafalaya River and Basin by control structures on the right bank of the Mississippi River. The U. S. Army Corps of Engineers is responsible for operation and maintenance of all project features except the main-line Mississippi River levee and road. Principal features are indicated on the project map and include a low-sill control structure with inflow and outflow channels, an overbank control structure, an auxiliary control structure, a navigation lock and channels, levees, closure of Old River, and bank stabilization as required.

Low-Sill Control Structure. The Old River Low-Sill Control Structure is a reinforced-concrete structure consisting of 11 gate bays, each having a 44-foot clear width between piers. The three center bays have a weir crest of 5.0 feet NGVD for passing low flows, and the other bays have a weir crest of 10.0 feet NGVD. Its total length is 566 feet between abutments. Vertical-lift steel gates are operated by two traveling gantry cranes. The low-sill control structure was completed in 1959. The inflow channel, completed in 1960, is 0.5 mile in length and was constructed with a bottom width of 1,000 feet, at an elevation of 5.0 feet NGVD. The outflow channel, also completed in 1960, is 7 miles long and was constructed with a bottom width of 900 feet at an average of 9.0 feet NGVD. About 4,500 acres of land adjacent to these channels was cleared during 1963 to provide better flow conditions in the overbank area.





Auxiliary Structure at Old River

The control structure entrance from the Mississippi River and the river upstream and downstream from that entrance for a distance of 8 miles and 2 miles, respectively, is under 24-hour daily surveillance from two radar towers to detect any waterborne traffic, vessels, derelicts, or massive flotsam that could impede flow through or endanger the structure. A manned picket push-boat (The *KENT*) is stationed below the entrance on the right descending side of the river, ready to intercept and fend-off dangerous vessels, derelicts, and flotsam on a 24-hour basis. The picket boat operation is assisted by the all-weather surveillance radar capability to detect locations of tows and vessels or derelicts entering the area of the river that could be affected by the draw-down of flows through the structure. The picket boat operators also assist in collection of waterborne statistics by contacting masters of vessels concerning cargo aboard, origin and destination of trips, tonnage, and barge loads and empties in transit.

Overbank Control Structure. The Overbank Control Structure is a reinforced-concrete structure consisting of 73 gate bays, each having a 44-foot clear width between piers. Weir crest is 52.0 feet NGVD. Total length is 3,356 feet between abutments. Flow is controlled by hinged timber panels operated by two traveling gantry cranes. This structure, completed in 1959, was operated in 1973, 1974, 1975, 1979, 1983, 1984, and 1985.

Auxiliary Control Structure. The Auxiliary Control Structure is a reinforced concrete structure consisting of six gate bays, each having a 62-foot clear width between piers. Weir crest is -5.0 feet NGVD. Total length is 442 feet between abutments. Flow is controlled by steel tainter gates. The inflow channel is about 1.9 miles in length with a bottom width of 500 feet. The outflow channel is about 0.9 mile in length with a bottom width of 475 feet. The structure was completed and placed in operation in 1986. Mitigation for the auxiliary structure consists of improvements on a 750-acre site in the vicinity and opening this site to archery hunting.

Old River Navigation Lock. The lock provides for continued navigation between the Atchafalaya, Ouachita-Black, and Red Rivers, and the Mississippi River through Old River. It has a width of 75 feet, a usable length of 1,190 feet, and sills at -11.8 feet NGVD. Construction of the lock was initiated in 1958 and completed in 1962. The approach channels were completed and the lock was placed in operation in 1963. A roadway on the levee crosses the lock on a lift bridge, which was completed in 1965.

Levee From Black Hawk to Torras. Approximately 16 miles of levee join the right bank main-line levee at Black Hawk with the control structures and lock described above and the main-line levee at Old River. Maintenance of this levee is the responsibility of the Little Falls and Levee District, Corps of Engineers.



Mississippi River bank restoration

River was completed during 1963. A levee crown width of 40 feet was provided for a roadway, built and maintained by the Louisiana Highway Department.

Bank Stabilization. In the inflow and outflow channels and along the Red and Atchafalaya Rivers between the outflow channel and the vicinity of Simmesport, bank stabilization works have been constructed as required to control the meandering of the main channels.

The current estimated construction cost of the Old River project is \$307,000,000. There are no non-Federal costs.

Rehabilitation Program. High stages during the 1973 flood caused a large scour hole to develop beneath the low-sill structure. The flood also caused bank erosion in the low-sill inflow and outflow channels. The scour under the structure caused the failure of one wingwall and part of the upstream concrete approach slab and damaged the foundation and drainage system under the structure and stilling basin.

Emergency rehabilitation work was begun under PI 99 to include construction of a rock dike to replace the failed wingwall, filling of the scour hole in front of the structure with riprap, exploratory drilling for damage assessment, filling of the voids underneath the structure with a special grouting material, and placing additional scour protection around the structure. The total cost of the PI 99 work was \$15,250,000.

To further address the residual problems of the 1973 flood and alleviate possible future problems, a comprehensive rehabilitation plan was developed for the Old River control project. The plan was performed under the maintenance program until FY 78 and then under a major rehabilitation program established in FY 78. It included such items as modification of the gates of the low sill structure to allow for orifice flow control, repair of erosion to the low-sill structure, stilling basin, additional channel stabilization for both

the inflow and outflow channels, and modifications to the overbank structure to protect against potential scour.

The major rehabilitation program was concluded in 1982 and restored a high degree of confidence in the ability of the Old River project to operate during normal conditions. However, serious concern remained about the capability of the project to handle potential emergency situations. The Auxiliary Control Structure was constructed to provide the needed capability to deal with emergencies, and with its completion the Old River project has been fully restored to its original capabilities.

Mississippi River, Cairo, Ill., to Baton Rouge, La.

(Mississippi River Commission)

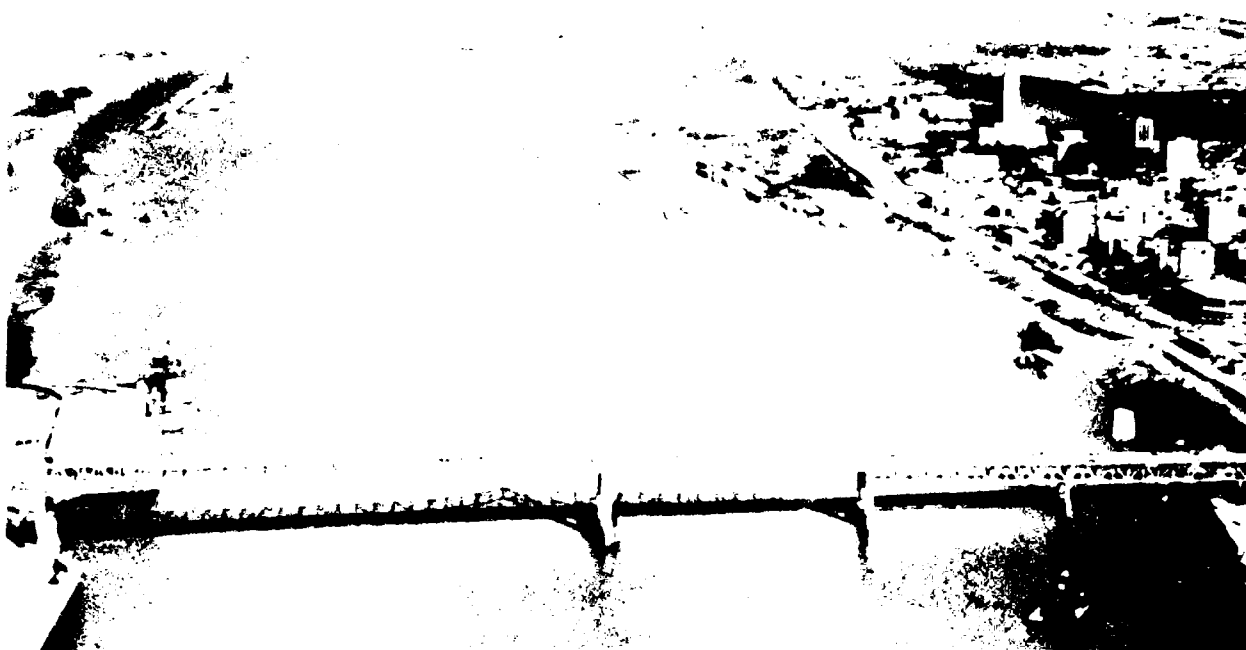
In 1896, Congress authorized a channel 9 feet deep and 250 feet wide at low water between Cairo, Illinois, and the Head of Passes, Louisiana. In 1928, this authorization was extended under the newly enacted "Flood Control, Mississippi River and Tributaries" project to include an increased channel width of 300 feet. In 1944, the authorized channel depth from Cairo to Baton Rouge was increased to 12 feet at low water, with the authorized width remaining at 300 feet.

Presently, in this 725-mile reach, a low-water navigation channel 9 feet deep and 300 feet wide is maintained by dredging and training works. The low-water depth will be increased as the Mississippi River channel is stabilized and contracted.

Closure of secondary channels (Mississippi River Channel Improvement) will result in increased efficiency of the main channel, with attendant lowering of navigation maintenance cost between Cairo and Baton Rouge. Maintenance performed during the low-water season now involves dredging through 40 to 70 crossings (shallow areas created as the river swings out of one bend and into another), out of a total of about 200.

The number of crossings dredged and/or redredged and the volume of dredging required in any one low-water season are dependent largely upon the stage and discharge cycle, slopes, width of channel, velocities, alignment, and channel stability. Dredging required to maintain the 9-foot-deep channel through these river crossings ranges from about 25 to 45 million cubic yards annually.

Aids to navigation on the Lower Mississippi River include fixed shore lights and markers and buoys marking the navigation channel. Total traffic on the river between Cairo and Baton Rouge, but not including Baton Rouge, during 1985, was 149,874,491 tons. The 5-year average, 1981-1985, was 149,398,004 tons. The total traffic between Minneapolis, Minnesota, and the Gulf of Mexico in 1985 was 383,964,109 tons, as compared with an average annual traffic of 405,485,324 tons in this reach during the 5-year period, 1981-1985.



Port of Baton Rouge

Baton Rouge Harbor—Devil's Swamp (New Orleans District)

In the northern portion of East Baton Rouge Parish, Louisiana, on the left descending bank of the Mississippi River, a barge channel 5 miles long, 12 feet deep and 300 feet wide was authorized by the River and Harbor Act of 24 July 1946. This project was later incorporated into the MR&I project by the Flood Control Act of 30 June 1948. The purpose of the channel was to provide an industrial expansion area for the Port of Baton Rouge. Initially, the first 2.5 miles were constructed and the remaining 2.5 miles were to be constructed when development of the initial portion warranted expansion to full project limits.

The sum of \$649,000 was voluntarily contributed by the Greater Baton Rouge Port Commission toward construction of the first 2.5 miles of the channel. This offer of participation above and beyond requirements of the authorizing act was made in the interest of speeding the appropriation of Federal funds for construction and indicated a sense of urgent need for the project by local interests.

The initial 2.5-mile channel was completed in July 1959 at a cost of \$699,200. Construction of the remaining 2.5 miles has not been warranted. This portion of the project was reviewed under the Deauthorization Review Program and subsequently was deauthorized in 1979.

The River and Harbor Act of October 1962 authorized the construction of additional dikes and retaining structures to raise the excavated material bank of the first 2.5 miles above Mississippi River stages at a Federal cost of \$299,500, provided local interests contributed \$100,500 toward the cost of the work.

Mississippi Delta Region (New Orleans District)

The objective of this feature is to increase wetlands productivity by the establishment of an ecological regimen favorable to the production of oysters, shrimp, fish, fur-bearing animals, and migratory waterfowl. Authorized by the Flood Control Act of 1965, the feature consists of four gated water- or salinity-control structures on the banks of the Mississippi River, with connecting levees and channels that will introduce fresh water from the Mississippi River to the bays and marshes of the Mississippi Delta. Salinity-control structures are authorized on the east bank of the river at Bohemia and Caernarvon (Seatsdale), Louisiana, and on the west bank at Myrtle Grove and Homeplace. The estimated project cost (October 1986) is \$54,600,000, of which \$41,000,000 is Federal and \$13,600,000 is non-Federal. A general design memorandum for the Caernarvon structure was completed in 1985. A post-authorization change report has been approved, relocating the Myrtle Grove site on the west bank upstream to Davis Pond.

Louisiana State Penitentiary Levee **Mississippi River** (New Orleans District)

The Louisiana State Penitentiary at Angola is located on the left descending bank between miles 294 and 310 of the Mississippi River.

The penitentiary is afforded some flood protection by a system of locally constructed levees. This project provides for raising and strengthening the existing mainline levee to provide protection from the Project Design Flood. The improved levee would be



Fishing on the Mississippi River

incorporated into the MR&T system. Improvement of the secondary levees was not economically justified. The project was authorized by the Water Resources Development Act of 1986.

Total project cost is \$23,400,000 (October 1985 price levels). The Federal share would be \$17,600,000; the non-Federal share would be \$5,800,000 including \$1,300,000 in lands, easements, and rights-of-way.

Work on the general design memorandum is not scheduled at this time.

Alluvial Valley Mapping

Topographic maps of the alluvial valley are prepared as a part of the work on the MR&T project. Quadrangle maps, scale 1:62,500, and topographic maps, scale 1:250,000, covering the alluvial valley and adjacent areas have been published and are periodically revised. These maps are available for sale to the public at the U. S. Army Engineer Districts, New Orleans, Louisiana, and Vicksburg.

Gages and Observations

Gages have been established and are maintained at various places on the Mississippi River, its tributaries and outlets, and offshore areas of Louisiana. Records of stream height (stage) and volume of flow (discharge) are published annually by each District of the Corps of Engineers.

Other observations are made by the Corps of Engineers to determine the quality of water in streams, lakes, and coastal areas. Measurements taken include those for salinity, temperature, dissolved oxygen, and suspended material. These data are used in studies related to construction of projects and normal operating procedures in the interest of preventing saltwater intrusion, maintaining navigation channels at proper depths, promoting a favorable ecological regimen for fish and wildlife, and other considerations.

Emergency Flood Activities

(PL 84-88)

Flood fighting is authorized under this law. The New Orleans District activated flood fight forces both in 1983 and 1984 to battle flooding on the MR&T flood control system. Although erosion and seepage problems developed, they were quickly taken care of and the flood control system remained intact.

Mississippi River

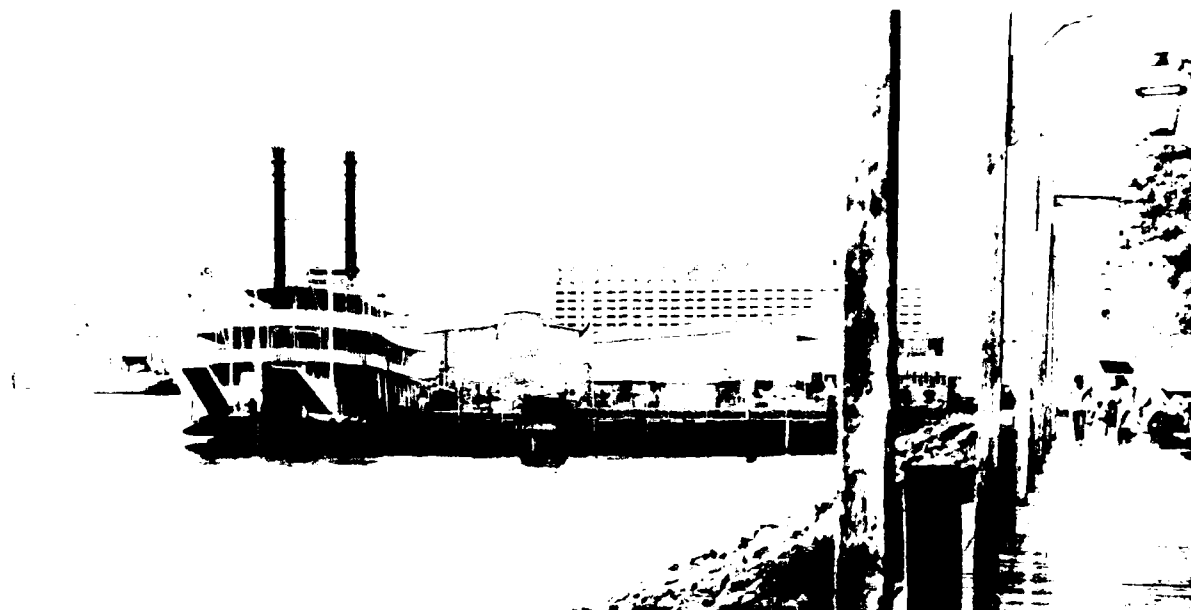
Navigation projects not part of the MR&T project for the Mississippi River Basin are described below.

Lake Providence Harbor (Vicksburg District)

Lake Providence Harbor consists of a dredged channel connecting with the Mississippi River on the west bank, near Mile 484 above the Head of Passes, and a turning basin at the landward end of the channel. The channel is 1.7 miles in length, with a depth of 9 feet over a bottom width of 150 feet. The turning basin is 1,000 feet long, flaring from a bottom width of 150 feet at its junction with the channel to 400 feet at a point 400 feet landward of the junction. The depth in the turning basin is 9 feet.

Excavated material from the channel and turning basin was deposited adjacent to the turning basin for a raised port area. Local interests constructed the dikes that were required to retain all excavated material. They also constructed a fill for railroad and highway access to the area.

Constructed under Section 107 of the River and Harbor Act of 1960, as amended, the project was completed in 1963 at a Federal cost of \$198,859. Subsequent to completion of the project, local interests have made additional expenditure on port facilities. Average annual traffic moving through this harbor, 1978-1985, was 644,602 tons.



Riverboat "Natchez" docked at New Orleans

Mississippi River, Baton Rouge to Gulf of Mexico

(New Orleans District)

Maintenance of sufficient navigation depths on the Mississippi River from Baton Rouge to the Gulf is a project of major importance. The Port of New Orleans, which is about 95 miles above the Head of Passes on the Mississippi River, is the largest port in the United States in waterborne commerce. Baton Rouge, located 135 miles upstream from New Orleans, is the fifth largest port in the nation.

The average annual traffic on the Mississippi River between Baton Rouge and the Gulf for the years 1978-1985 was 277,340,383 tons. Corn, soybeans, crude petroleum, coal and lignite, and gasoline account for the majority of cargo that travels this waterway. Other major cargoes of the more than 150 categories listed for this waterway include aluminum ore, distillate fuel oil, basic chemicals, salt, sulphur, and phosphate rock.

Several separate projects for the Mississippi River, Baton Rouge to New Orleans, South Pass, and Southwest Pass were combined by the River and Harbor Acts of 1945 and 1962. Authorized dimensions are: between Baton Rouge and New Orleans, 40 feet deep by 500 feet wide; 40 feet deep for a width of 500 feet within the 35-foot-deep by 1,500-foot-wide channel in the Port limits of New Orleans; New Orleans to Head of Passes, 40 feet deep by 1,000 feet wide; Southwest Pass, 40 feet deep by 800 feet wide; Southwest Pass bar channel, 40 feet deep by 600 feet wide; South Pass, 30 feet deep by 450 feet wide; and South Pass bar channel, 30 feet deep by 600 feet wide.

The initial project is complete. In 1974 additional bank restoration works (foreshore dikes, bank nourishment, bulkheads, jetty heads, and lateral pile dikes) were

determined to be required to restore the banks of the Mississippi River below Venice and in Southwest Pass that were severely damaged by the 1973 high water. Additional deterioration has occurred subsequently, requiring an increase in the scope of these works and the restoration of the east and west jetties at the mouth of Southwest Pass. Construction of the works started in June 1985. As of December 31, 1987, approximately 18 miles of rock foreshore dikes and 4 miles of bank nourishment, out of a total of approximately 50 miles, have been completed. Some of the bank nourishment needs have been and will continue to be satisfied with maintenance dredging material. Also construction of the 45-foot channel will contribute material toward the bank nourishment needs. Any dredged material not required for bank nourishment will be used to create marsh. Estimated construction cost is about \$320 million, plus \$29,000 for U. S. Coast Guard for aids to navigation.

Construction of the modifications will make possible maintenance to the authorized depth 90 percent of the time for the foreseeable future, with substantially less dredging than at present. Presently, an average of 20 million cubic yards is dredged annually. Without the project, the average would be about 54 million cubic yards over the next quarter century, at which time it will be impracticable to maintain 40 feet at all. With completion of the project, the average annual maintenance dredging requirements will be 13 million cubic yards.

The project was modified in 1956 to include construction of the Mississippi River Gulf Outlet, a seaway canal 36 feet deep over a bottom width of 500 feet from the Inner Harbor Navigation Canal in New Orleans to Breton Island and then 38 feet deep over a bottom width of 600 feet to the Gulf of Mexico. This is complete.

**Mississippi River Ship Channel,
Gulf to Baton Rouge, La.**
(New Orleans District)

A study was initiated in 1968 to review the existing project, with particular reference to providing a channel having a minimum depth of 50 feet and bottom width of 750 feet from New Orleans to the Gulf of Mexico, and a channel from New Orleans to Baton Rouge, having a minimum depth of 50 feet and bottom width of 500 feet.

The study was completed in 1981. Recommendations in the final report were that the navigation channel in the Mississippi River be enlarged from its present 40-foot depth to a depth of 55 feet over a bottom width of 750 feet; that a turning basin be provided at the upstream end of the channel in Baton Rouge; and that measures be constructed to mitigate the effects of increased saltwater intrusion on municipal water supplies.

The project was authorized by Title IV of the Second Supplemental Appropriations Act of FY 1985 (PL 99-88) dated August 15, 1985. The Water Resources Development Act of 1986 (PL 99-662), dated November 17, 1986, provided additional authorization by formalizing the cost-sharing provisions of the project, permits the local sponsor (Louisiana Department of Commerce) to enact user fees to defray their portion of the project costs, and implements harbor maintenance fees to help pay the Federal cost of the project. In terms

of channel depths up to 45 feet, the cost-sharing requirements are 75 percent Federal and 25 percent non-Federal for construction and 100 percent Federal for maintenance. For channels deeper than 45 feet, the cost-sharing requirements are 50 percent Federal and 50 percent non-Federal for both construction and maintenance.

At the request of the local sponsor, the first increment of work on the project will provide a 45-foot channel from the Gulf to mile 181 above Head of Passes, near Donaldsonville, Louisiana. A Local Cooperation Agreement (LCA) was signed by the State of Louisiana and the Federal government on June 30, 1986, for this first increment. A supplemental LCA has been completed as a result of PL 99-662. The total cost of the first increment is \$60,000,000, shared \$29,300,000 Federal and \$30,700,000 non-Federal.

Construction began in July 1987. A 45-foot channel to New Orleans will be available by the end of 1987. Dredging of the 45-foot channel to mile 181 is scheduled for 1988.

An interim saltwater intrusion mitigation plan will be implemented while the final plan is being determined. The interim plan consists of barging fresh water to the three water treatment plants in Plaquemines Parish.

Dredged material from construction and maintenance of this project will be used for bank nourishment and to build up to 34,000 acres of marsh.



Side cast dredge

Mississippi River Outlets, Venice (New Orleans District)

These outlets were provided by enlargement of the existing channels of Baptiste Collette Bayou and Grand-Tigre Passes. Channel dimensions are 14 feet deep over a bottom width of 150 feet, except for entrance channels which are 16 to 250 feet. Jetties to reduce the cost of maintenance dredging are constructed to the 6-foot contour.

The extensive offshore oil operations, most of which are based in Venice, are realizing considerable savings in transportation costs using these channels rather than South or Southwest Pass of the Mississippi River. Commercial and sport fishermen and hunters derive similar time and distance benefits.

The project was authorized by the River and Harbor Act of 1968. Estimated Federal cost (1977) is \$5,600,000 for construction, plus \$60,000 for the U.S. Coast Guard for aids to navigation. Estimated non-Federal cost is \$1,500,000. Channel construction was completed in the fall of 1978. The jetty construction was completed in 1979 at an additional cost of approximately \$2,157,000.

Marsh is created with material dredged from Tiger Pass.

Nesting islands got sea-birds have been built near Baptiste Collette Bayou.

Madison Parish Port (Vicksburg District)

A feasibility study (detailed project report) prepared under authority of Section 107 of the 1960 River and Harbor Act, as amended, recommended improvements to river access to the Madison Parish Port.

Local interests requested assistance in obtaining river access to the port by removal of a sandbar, which had shifted to the point where it blocked port access. The sandbar blockage occurred after initial development of the port by the Madison Parish Port Commission.

The recommended plan of improvement provided for construction of a 150-foot-wide by 1,000-foot-long navigation access channel, transitioning into a 200-foot-wide channel, 400 feet in length, and a turning basin 350 feet wide and 1,100 feet long. The access channel is maintained at a minimum depth of 9 feet. The project was completed in December 1980 at a cost of \$656,000.



New Orleans to Venice hurricane protection levee

Programs and Surveys

Flood Plain Information Reports

Port of Lake Providence (Vicksburg District). A special flood hazard information report, covering the Mississippi River in the vicinity of the Port of Lake Providence, was prepared as requested by the Executive Director of the Lake Providence Port Commission. The report was completed in 1970.

Surveys Authorized or Under Way

Lake Providence Port (Vicksburg District). A study was completed in 1976 to determine if modifications to the existing harbor project were advisable. Results of the study indicated that no further modifications to the project were economically feasible at that time. As requested by the Lake Providence Port Commission, a reconnaissance study is being conducted under the Continuing Authorities Program to determine the feasibility of expanding the port facility.

Lower Mississippi Region Comprehensive Study (Mississippi River Commission). This study was conducted to provide a framework plan for developing the water and related land resources in the region to meet foreseeable short- and long-term needs. The report was forwarded to the Water Resources Council,

Mississippi River, Baton Rouge, La., to Natchez, Miss. (New Orleans District). The study was initiated in 1974 to review reports on the Mississippi River, Baton Rouge to the Gulf of Mexico, with particular reference to extending the deepwater navigation project from its present upstream limits at Baton Rouge, Louisiana, to Natchez, Mississippi. In 1976 this study was incorporated into the "Mississippi River, Cairo, Illinois, to Baton Rouge, Louisiana," study.

Mississippi River, Cairo, Ill., to Baton Rouge, La. (Mississippi River Commission). In response to a resolution adopted 19 June 1972, a study was initiated in 1977 to determine whether the existing Mississippi River channel should be modified to provide a navigation channel with greater dimensions than now authorized between Cairo, Illinois, and Baton Rouge, Louisiana. A navigation channel with a minimum depth of 9 feet and a minimum width of 300 feet is presently being maintained. Initial public meetings were held in Memphis, Tennessee, Vicksburg, Mississippi, and Baton Rouge, Louisiana, in 1977. Results of reconnaissance studies indicate that a larger channel is not economically justified at this time.



Louisiana — the sportman's paradise

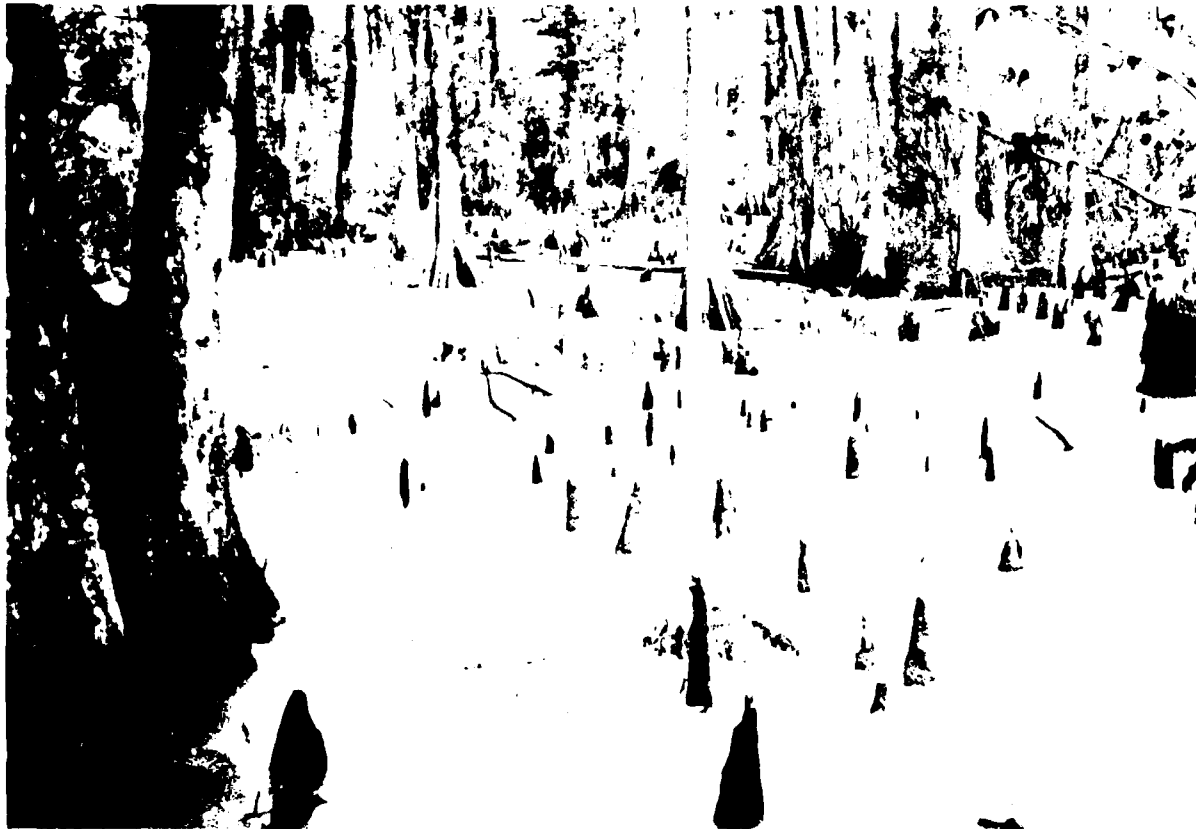
Atchafalaya River Basin

Introduction

The Atchafalaya River Basin, in south-central Louisiana, originates at the confluence of the Mississippi, Red, and Atchafalaya Rivers near Simmesport. The basin extends in a north-south direction from the latitude of Old River and Bayou des Glaises to the Gulf of Mexico.

The Atchafalaya River is the largest of all distributaries of the Mississippi. Improvements in the Atchafalaya River Basin have been authorized and constructed primarily under the MR&T project. Basin flood protection works are an integral and extremely important part of the lower Mississippi River. At the latitude of Old River, the design project flood has been

determined to be 3,000,000 cubic feet per second. The project allows one-half of the flow to continue down the main Mississippi River channel and the other half to be introduced through the Morganza and West Atchafalaya Floodways and the Atchafalaya River, into the Atchafalaya Basin Floodway. Floodways follow opposite sides of the Atchafalaya River to the end of the levee system along the river. There they merge into a single broad floodway that discharges into the Gulf of Mexico through Wax Lake Outlet and the lower Atchafalaya River. Portions of this project are complete, and individual projects in the basin are described subsequently.



Cypress swamp in the Atchafalaya Basin

Atchafalaya River Basin

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- e. Bayou Sorrel Lock
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- g. Charenton Floodgate
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MR&T Projects

Atchafalaya Basin Floodway

(New Orleans District)

The floodway is located between protection levees approximately 15 miles apart extending from the lower limits of the Morganza and West Atchafalaya Floodways, at the latitude of Krotz Springs, to Morgan City and through the Lower Atchafalaya River and Wax Lake Outlet, to the Gulf of Mexico. The improvements necessary to this floodway are described as separate features.

Atchafalaya Basin Bank Stabilization

(New Orleans District)

Bank stabilization works are being constructed from above the vicinity of Simmesport to the lower end of the main stem levee system to maintain a favorable alignment for navigation and for protection of the levee system. Through December 31, 1986, 36.7 miles of revetment have been placed.

Atchafalaya Basin Levees

(New Orleans District)

All levees in the Atchafalaya Basin except the guide levees for the Morganza Floodway are included under this heading. The levee system is designed to protect agricultural areas and towns from the normal high waters of the Mississippi-Red River backwater area, floods on the Atchafalaya River, and when necessary, to introduce excess floodwaters of the Mississippi and Red Rivers at the latitude of Old River, through the Atchafalaya River, the Morganza, West Atchafalaya, and Atchafalaya Basin Floodways, to the Gulf of Mexico via Wax Lake Outlet and the Lower Atchafalaya River. The levees also protect valuable

agricultural lands from backwaters created by the floodwater. The system includes about 449 miles of levees and currently will contain a flood of about 1,100,000 cubic feet per second. Work is under way to raise the floodway levees to an elevation to confine a design flow of 1,500,000 cubic feet per second. Individual levee features within the existing Atchafalaya system include the following:

East Atchafalaya Basin Protection Levee (EABPL).

The levee begins at the lower end of the east guide levee of the Morganza Floodway, extends southward to and through Morgan City to Cutoff Bayou, and includes the Bayou Boeuf and Bayou Sorrel Locks. The length of this system is 106.7 miles, including 1.3 miles of floodwall along Morgan City front and about 0.4 mile of floodwall below Morgan City. The Atchafalaya Basin Levee District, the city of Morgan City, and the St. Mary Parish Police Jury are responsible for operation and maintenance of this feature.

West Atchafalaya Basin Protection Levee (WABPL).

The levee begins near the town of Hamburg, where it joins the Bayou des Glaives fuseplug levee. It extends in a south and southeasterly direction to the Wax Lake Outlet at the latitude of the East and West Calumet Floodgates and thence eastward through Berwick to the Gulf Intracoastal Waterway. This levee extends 128.7 miles and connects with 1 mile of floodwall along the front of the town of Berwick. Structures along the levee include Bayou Darbonne and Courtableau drainage structures, the Charenton Floodgate, and the Berwick Lock, described subsequently.

The Red River, Atchafalaya, and Bayou Boeuf Levee District, the Atchafalaya Basin Levee District, the town of Berwick, and the St. Mary Parish Police Jury are responsible for operation and maintenance.

East Atchafalaya River Levee. The levee extends from the junction of the Atchafalaya, Old, and Red Rivers along the east bank of the Atchafalaya River to approximately 10 miles below Alabama Bayou, a distance of 52.5 miles. The Atchafalaya Basin Levee District is responsible for maintenance.

West Atchafalaya River Levee. The levee extends southward from Bayou des Glaives levee at Simmesport along the west bank of the Atchafalaya River and Bayou La Rose, to approximately 2 miles below Butte La Rose, a distance of 60.1 miles. Additional levees include the Simmesport ring levee, 1.6 miles in length, and its drainage outlet, Brushy Bayou Drainage Structure, Melville ring levee, 4.1 miles in length and its drainage structures, and the Krotz Springs ring levee, 1.7 miles in length. The total length of levee in this system is 67.5 miles. The Red River, Atchafalaya, and Bayou Boeuf Levee District is responsible for maintenance of the portion of this levee from Simmesport to Bayou Courtableau. The remaining portion is maintained by the Atchafalaya Basin Levee District.



East Atchafalaya Basin Protection Levee

Bayou des Glaives Fuseplug Levee. The levee extends from the town of Simmesport west and along the south bank of Bayou des Glaives, to the WABPL near Hamburg, a distance of approximately 8 miles. This levee protects the lands in the West Atchafalaya Floodway from floodwaters in the Mississippi-Red River backwater area until stages requiring the use of the West Atchafalaya Floodway are reached. Floodwaters will then enter the floodway by overtopping the levee. The Red River, Atchafalaya, and Bayou Boeuf Levee District is responsible for maintenance.

Mansura Hills to Hamburg Levee. The levee extends from the Mansura Hills, along the north bank of Bayou des Glaives, to the state-owned drainage structure in Bayou des Glaives (Bordelonville Floodgate), across the structure and southward to the junction of the WABPL and the Bayou des Glaives fuseplug levee, near the town of Hamburg. This 20.5-mile levee protects the area west of the floodways and west of Marksville from Mississippi-Red River backwater flooding. The Red River, Atchafalaya, and Bayou Boeuf Levee District is responsible for maintenance.



Construction work on Atchafalaya Basin Protection Levee

Levees West of Berwick. A total of 56.5 miles of intermittent levees tying into high ground are located west of Berwick. They have been designed to protect the cultivatable lands along the Teeche and Sale' Ridges from the backwaters created by the introduction of floodwaters from the Mississippi and Red Rivers through the floodways, the Wax Lake Outlet, and the Lower Atchafalaya River.

The levee system begins at the lower end of the WABPL below Berwick and extends westward generally along the north bank of the Intracoastal Waterway and east bank of Wax Lake Outlet, to the East Calumet Floodgate. It continues on the opposite side of Wax Lake Outlet at the West Calumet Floodgate, following a southerly and westerly direction along Wax Lake Outlet and the north bank of the Gulf Intracoastal Waterway, to high ground at Bayou Sale'. It then flows along an irregular alignment around the Bayou Sale' Ridge below the Intracoastal Waterway and northward above the Intracoastal Waterway to the Charenton Drainage Canal near Baldwin.

Drainage for the enclosed area is through about 38 miles of canals, 3 drainage structures, 20 gated culverts, an inverted siphon, and pumping stations.

The Maryland, Ellerslie, Franklin, Bayou Yokely, Bayou Yokely Enlargement, Wax Lake East, and North Bend Pumping Stations, 19 of the gated culverts, and the Wax Lake East and Wax Lake West Drainage Structures are complete. The Wax Lake East inverted siphon was completed in 1963. The Wax Lake West Pumping Station was completed in 1965, and enlargement of the Franklin Pumping Station was completed in 1977.

EABPL, Landside Drainage Improvements (New Orleans District)

After closure of the Bayou Pigeon navigation connection, and during the construction of the Bayou Sorrel Lock, drainage intercepted by the EABPL was provided for by enlarging portions of the borrow pit and nearby streams. These improvements serve as a navigation route between Bayou Sorrel Lock and the Intracoastal Waterway. Although about 22 miles longer than the project route between Port Allen and Morgan City, the landside route affords easier navigation in times of flood and swift currents. During times of low rainfall east of the levee, fresh water may be passed through Bayou Sorrel and Port Allen Locks into the channels east of the levee. The drainage improvements are described below.

Lottie to Bayou Maringouin Borrow Pit Enlargement. This improvement consists of the enlargement of the restricted sections of the landside borrow pit between a point one-quarter mile south of Lottie and Bayou Maringouin. Work was completed in 1940, at a cost of \$126,000.

Bayous Boeuf-Long Drainage Canal and Enlargement of Bayou Chene. The improvement of existing streams along the landside of the EABPL from the Bayou Sorrel Lock to the vicinity of Lake Palourde, a new

land cut around the east side of Lake Palourde to Bayou Boeuf, and the enlargement of Bayou Boeuf, to provide a minimum channel of 9 by 100 feet for drainage and navigation from the Intracoastal Waterway to the levee borrow pit, were the features of this project. The improvements were completed in 1947 at a cost of \$501,000.

WABPL, Landside Drainage Improvements (New Orleans District)

Drainage intercepted by the WABPL is provided for with this project by enlargement of the landside borrow pit and natural streams in the area. Features of these improvements are as follows:

Bayou des Glaises Diversion Channel, State Canal, and Bayou Roseau. The Bayou des Glaises Diversion Channel, completed in 1939, connects Bayou des Glaises with the landside borrow pit of the WABPL. This channel will operate at full capacity when the State-owned floodgate on Bayou des Glaises near Bordelonville is closed. The floodgate is now part of the MR&I system and is never opened. A permanent closure to replace the floodgate is now under construction. Other landside drainage intercepted by the Mansura Hills to Hamburg levee is taken off by the enlarged channel of State Canal and Bayou Roseau, between Mill Bayou and the main diversion channel, which was completed in 1943. The cost of these improvements was \$228,000.

Bayou des Glaises Culvert. The culvert consists of a 72-inch corrugated pipe culvert with flap gate and concrete stilling basin. It passes through the Old Bayou des Glaises levee connecting the floodway side borrow pit of the Bordelonville-Hamburg levee with Bayou des Glaises proper, and provides an outlet for the water accumulating within the Bayou des Glaises loop. It was completed in 1939 at a cost of \$26,000.

Borrow Pit Enlargement Between Hamburg and Courtableau. Enlargement of inadequate sections of the borrow pits was completed in 1939 at a cost of \$345,000.

Bayou Darbonne Drainage Structure. The structure is located in the WABPL at the Bayou Darbonne crossing and consists of a reinforced-concrete box culvert 10 by 10 by 265 feet long, with a motor-controlled gate. This structure is used during low stages on the landside to permit flow, when possible, from the West Atchafalaya Floodway to Bayou Teche through Bayou Courtableau. It thereby provides water frequently needed for irrigation purposes. During landside flood stages, floodwaters in the borrow pit pass through the structure to the floodway. It will be closed during operation of the West Atchafalaya Basin Floodway. The structure was completed in 1941 at a cost of \$60,000 and is operated by the U. S. Army Corps of Engineers.

Bayou Courtableau Diversion Channels and Control Structure. The original channel of Bayou Courtableau was blocked by construction of the WABPL. To retain and introduce low-water flow into Bayou Teche for use

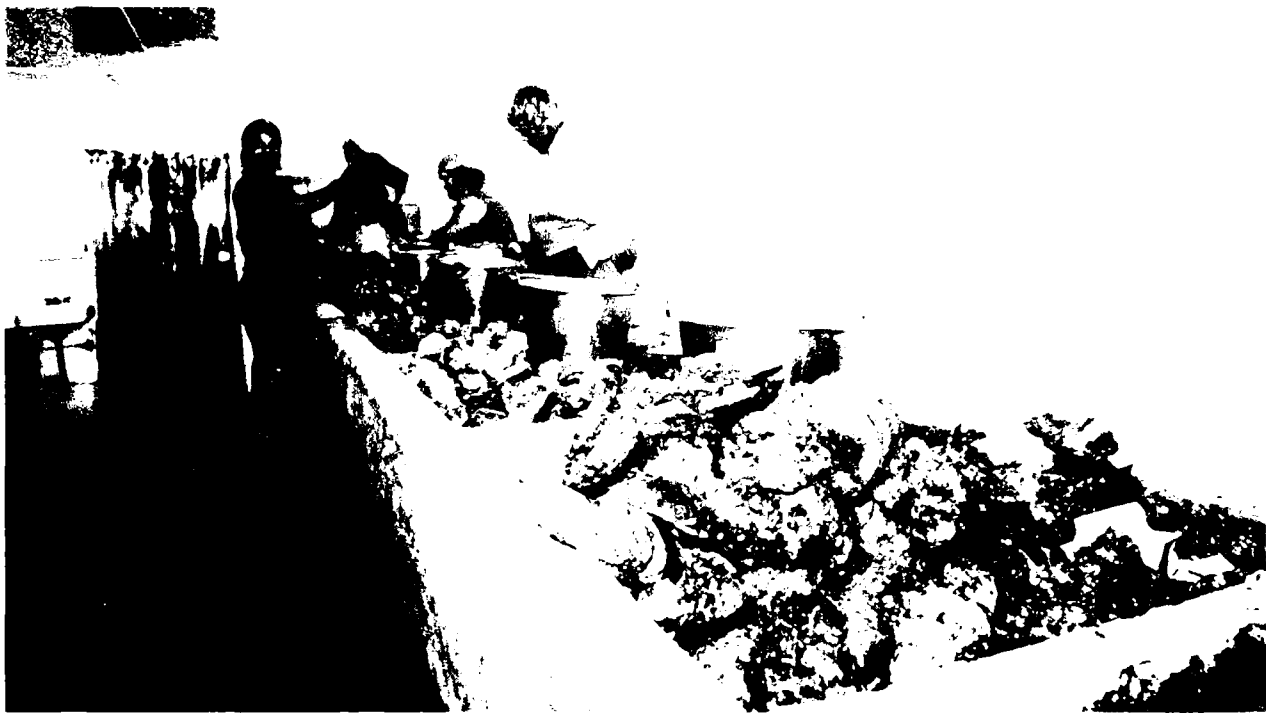
in rice irrigation in the Teche and Vermilion River Basins, where it is frequently needed, two reinforced-concrete weirs with crests of 18 feet NGVD were constructed on the south bank of Bayou Courtableau just west of the WABPL. Floodflows pass over the weirs into two adjacent channels excavated below the weirs, then into the borrow pit below. The width of the east weir is 482 feet and the west weir, 517 feet. The diversion channels were completed in 1939 at a cost of \$36,700, and the structures were completed in 1942 at a cost of \$14,500. The structures are operated and maintained by the U.S. Army Corps of Engineers.

Courtableau Drainage Structure and Channels. The structure and channels are located approximately 2 miles southeast of the village of Courtableau, in St. Landry Parish. Construction of the WABPL intercepted the natural drainage of the Bayou Courtableau Basin, located west and north of the levee. The feature consists of: a five-barrel (each 10 feet wide and 15 feet high), reinforced-concrete, box-type culvert 220 feet long, with five mechanically operated vertical-lift gates at the outlet end; an inlet channel approximately 1,800 feet long; an outlet channel approximately 23,500 feet in length; a 1,300-foot levee along the south bank of the inlet channel with a 12-foot-wide gravel road on the crown; and guide levees on both banks of the outlet channel for confining drainage flows passed through the structure. The feature was completed in 1950 at a cost of \$1,400,000. The structure is operated and maintained by the Corps of Engineers.

Bayou Berard Drainage Canal. The canal extends from the landside borrow pit in the vicinity of Cyremort, about 3 miles below Henderson, to the head of Lake Catahoula, a distance of 7 miles. Enlarged twice, it now has a bottom width of 65 feet, 15 feet NGVD. Flow through this enlarged channel supplements the runoff through the borrow pit. It was completed in 1940 at a cost of \$277,000.

Cyremort to Dauterive. Channel improvement from Cyremort to Dauterive extends in a southerly direction in the landside borrow pit, commencing about 1 mile south of Cyremort and ending opposite the head of Lake Dauterive, a distance of 14.3 miles. The borrow pit was enlarged, and Bayou Mercier and two distributaries of Lake Catahoula were improved. The channel and the Bayou Berard Drainage Canal are supplemental improvements. The channel was completed in 1941 at a cost of \$791,000.

Charenton Drainage Canal. This canal is a drainage connection extending from the Charenton Floodgate to Bayou Teche, and thence along Bayou Teche and a new land cut to West Cote Blanche Bay, an arm of the Gulf of Mexico. It provides an outlet for the intercepted drainage carried by the WABPL borrow pit. The canal has a bottom width of 75 feet, 30 feet NGVD, and a design discharge capacity of approximately 22,000 cubic feet per second. This improvement required the construction of one railroad bridge and three highway bridges. It was completed in 1948 at a cost of \$2,955,000.



Fisheries — a major element in Louisiana's economy

Atchafalaya River Improvement Dredging (New Orleans District)

Improvement dredging of the leveed channel of the Atchafalaya River and its outlets is provided under this feature. Work includes the enlargement of the openings of existing railroad and highway bridges across the Atchafalaya River and such alterations of existing crossings of this river as are deemed necessary to the execution of the plan. Other restricted sections of the channel are to be enlarged to increase the floodflow capacity of the Atchafalaya River. The improvement extends from the confluence of the Red, Old, and Atchafalaya Rivers to Alabama Bayou, Mile 57. All work has been completed, unless at a later date it is found that additional improvements are required. The costs of construction to date are as follows:

<i>Item</i>	<i>Amount*</i>
Dredging	\$1,080,000
Simmesport highway and railroad bridge 897-foot extension and 3 deep piers (1937)	986,000
N.O.T.&M. Railway bridge at Krotz Springs, 1,270-foot extension and 2 deep piers (1937)	824,000
Fascine mattresses	68,000
Raising entire bridge 6 feet (1953)	370,000
I. & P. Railway bridge at Melvinne extension (1952)	1,250,000
Total	\$4,578,000

* The nonstructural costs for the improvement are included in the overall project cost.



East Atchafalaya Basin Protection levee and floodwall

Atchafalaya Basin Main Channel Improvement Dredging (New Orleans District)

The flood-carrying capacity of the Atchafalaya is being preserved by dredging a continuous main channel through the swamps of the central portion of the basin. The capacity of the floodway is being reduced by sedimentation in the floodway. The main channel will preserve floodway capacity and reduce wetland loss by reducing overbank sedimentation in the lower Atchafalaya floodway. The dredging extends from the Atchafalaya River at Alabama Bayou to the main body of Sixmile Lake, near Morgan City. No work has been performed on this feature since December 1968. The need and feasibility of continued channel dredging were addressed in the Phase I General Design Memorandum approved Feb. 28, 1983. The current plan provides for future channel dredging only to the extent of providing sufficient material to construct channel training works necessary to achieve a desirable degree of confinement or flows to the main channel and thereby reduce overbank sedimentation. Prior costs for channel dredging are:

<i>Item</i>	<i>Amount*</i>
Dredging (completed)	\$ 45,470,000
Pipeline and utilities (completed)	914,000
Total	\$46,384,000

Railroad Bridge at Berwick (New Orleans District)

To accommodate the introduction of additional floodwaters through the Atchafalaya Basin, the Texas and New Orleans (Southern Pacific) railroad bridge at Berwick was raised 4 feet. Work was completed in 1942 at a cost of \$360,000. Further modification of this bridge for navigation has been directed under the Truman-Hobbs Act.

Wax Lake Outlet (New Orleans District)

The Corps constructed this outlet to convey floodwaters from the Atchafalaya Basin. The outlet, with a present capacity of 300,000 cubic feet per second, is an additional means of reducing flood heights during extreme floods. It protects the cultivable lands along the Teche and Boeuf Ridges and vital transcontinental communication routes at the latitude of Morgan City. The dredged channel is about 10 miles west of Berwick and extends from Sixmile Lake through the Teche Ridge and Wax Lake into Atchafalaya Bay, a distance of about 15.7 miles.

The channel has a bottom width of 300 feet from Six Mile Lake to a point one-half mile below Bayou Teche, 400 feet below that point, and a uniform depth of 45 feet NGVD. The excavated material from the channel dredging was used to construct guide levees extending from the WABPI to the Intracoastal Waterway on each side of the outlet.



Wax Lake Outlet

The East and West Calumet Floodgates, described in the following paragraph, were constructed where the guide levees cross Bayou Teche to allow continued navigation and to regulate floodflows. New bridges were constructed to carry U.S. Highway 90 and the Southern Pacific lines over the dredged channel.

This improvement was completed in 1942 at a cost of \$7,122,000, and is maintained by the U.S. Army Corps of Engineers, except for the bridges, which are maintained by their owners.

Construction of an outlet control structure is underway. This structure will limit discharges through the outlet to 30 percent of the river discharge during low and normal flows.

East and West Calumet Floodgates

(New Orleans District)

These floodgates are located in the East and West Wax Lake Outlet guide levees where the levees cross Bayou Teche. Each floodgate is a reinforced-concrete structure 161 feet long, with a 45-foot clear width, a sill -9.8 feet NGVD, and steel sector gates.

The floodgates allow navigation in Bayou Teche and regulate flows to some extent. They were completed in 1950 at a cost of \$1,320,000. Operation and maintenance are the responsibility of the U.S. Army Corps of Engineers.

Charenton Floodgate

(New Orleans District)

This floodgate is located in the WABPL, about 1 mile north of Charenton. It is a reinforced-concrete structure 175 feet long, with a clear width of 45 feet, a bottom -10.8 feet NGVD, and steel sector gates.

The floodgate regulates flows between Bayou Teche and the Atchafalaya Basin Floodway and affords a navigation connection between Grand Lake and the

WABPL borrow pit and Charenton Drainage Canal. In 1951, a removable bridge with a low steel elevation of 20.7 feet NGVD was constructed across the structure. The floodgate was completed in 1948 at a cost of \$298,000. Charenton Floodgate is operated by the U.S. Army Corps of Engineers.

Berwick Lock

(New Orleans District)

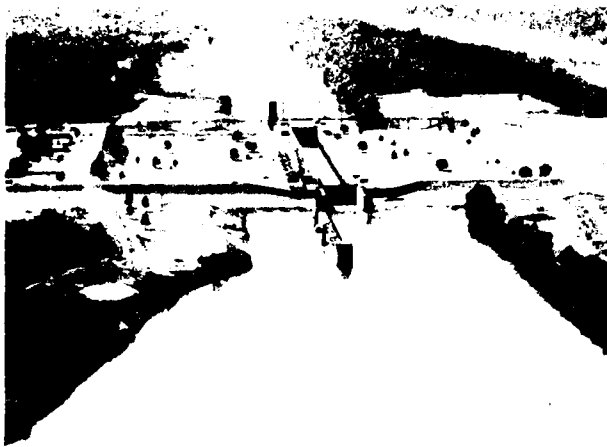
Located in the WABPL near its crossing of the Lower Atchafalaya River, about 2 miles north of the town of Berwick, this lock is a reinforced-concrete structure 45 feet wide, with sills at an elevation of -9.8 feet NGVD and a usable length of 300 feet between steel sector gates. It affords a navigation passage through the levee and permits navigation up the Lower Atchafalaya River to Patterson and to Bayou Teche. The lock was completed in 1951 at a cost of \$2,100,000 and is maintained by the U.S. Army Corps of Engineers.

Bayou Sorrel Lock

(New Orleans District)

This lock, located in the TABPL at its intersection with the Morgan City-Port Allen Route to the Gulf Intracoastal Waterway, about 15 miles below Plaquemine, provides a navigation connection through the levee. The structure consists of two reinforced-concrete gate bays equipped with steel sector gates and connected with an earth chamber having a timber guide wall on both sides. The usable length is 790 feet, the clear width is 56 feet, and the depth over the sills is 14 feet below mean Gulf level.

The navigation route between Port Allen and Morgan City through the lock is about 22 miles shorter than the landside waterway. The lock was completed in October 1952 at a cost of \$4,700,948, and is operated and maintained by the U.S. Army Corps of Engineers. Average annual traffic through the lock, 1980-1985, was 21,488,000 tons.



Bayou Sorrel Lock

Bayou Boeuf Lock

(New Orleans District)

This lock is located in the FABPI, below Morgan City, at a point where it crosses Bayou Boeuf and the Intracoastal Waterway. It consists of two reinforced-concrete gate bays, equipped with steel sector gates connected by an earth chamber which has a timber guide wall on both sides. The lock has a length of 1,148 feet, a clear width of 75 feet, and a depth over sills of 13 feet at mean low Gulf level. The Bayou Boeuf Lock provides for navigation through the levee, which protects the areas and communities east of Morgan City from the floodwaters from the Atchafalaya Basin. It was opened to navigation in September 1954, and dredging of all approach channels together with other improvements were completed early in 1955. The lock, excluding approach channels, was completed at a cost of about \$2,754,000. It is operated and maintained by the U.S. Army Corps of Engineers. Average annual traffic through the lock, 1980-1985, was 27,139,000 tons.

Improvements for Access, Fish and Wildlife, and Recreation

(New Orleans District)

A program has been initiated to develop a plan to minimize disruption to basin access and damage to the fish and wildlife resource occasioned by the construction of the flood control improvements. Under this plan, positive measures are being taken on all hydraulic dredging done in the basin to ensure that all excavated material is confined to designated areas, and that all liquid effluent from the dredging process is returned to the main channel. Features for fish, wildlife, and recreation are provided for the Atchafalaya Basin Floodway system project.

East and West Access Channels. This feature consists of channels, 7 by 80 feet, which provide navigable connections between the East and West Atchafalaya guide levees. They are used by both commercial and

recreational craft and permit basin-wide access to and from the main channel. Another function of these channels is to distribute fresh water to the overbank areas which they traverse.

East and West Freshwater Distribution Channels.

These channels are being maintained to distribute fresh water on the east and west sides of the Atchafalaya Basin during seasons of low water on the Atchafalaya River system. The intermittent overflow from these channels is beneficial to fishing and hunting activities in the area.

In addition to the east and west access channels and the confluence of Whiskey Bay pilot channel and the Atchafalaya River, realignment of the east freshwater distribution channel at the main channel will be accomplished for sediment control. The general design memorandum covering this work is scheduled for completion in early 1989.

East and West Freshwater Diversion Structures. These structures will be constructed in the Atchafalaya River levees, at Sherburne and the vicinity of Bayou Courtableau, to supply fresh water from the Atchafalaya River to the wetlands on both the east and west sides of the river. Each structure will consist of two 10- by 10-foot gated culverts.

Water introduced by the gravity flow into the Ramah area of the Atchafalaya Basin Floodway, east of the Atchafalaya River, will be distributed by the structure at Sherburne through Big Alabama Bayou, Bayou des



Louisiana wildlife - egret

Glaises, and connecting channels. Water introduced into the Henderson area of the Atchafalaya Basin Floodway, west of the Atchafalaya River, will be distributed by the Bayou Courtableau structure through Little Fardoche Bayou and connecting swamp channels.

Retention Dikes. Prior to dredging in the Atchafalaya Basin, a system of dikes, ditches, and weirs is constructed to prevent damage to the high-value habitat. The dikes serve to confine excavated material to carefully chosen areas, while the ditches and weirs return spill waters from the dredging process to the main channel. This system precludes the incursion of sediments into existing off-channel open-water areas and minimizes alteration of the basin's unique environment.

As part of this system, an existing opening in the main channel bank at Pat's Throat will be maintained. Openings at Jakes Bayou and "The Crevasse" will also be maintained if experience shows it to be practicable.

Atchafalaya River

(New Orleans District)

Channel work on the Atchafalaya River, completed in February 1956 at a cost of \$303,500, is a navigation feature of the MR&T project. The channel, 12 feet deep over a bottom width of 125 feet, extends from the Gulf Intracoastal Waterway at Morgan City to the Mississippi River via the Atchafalaya and Old Rivers. As a shortcut from the Gulf to the upper Mississippi, this project affords travel savings of 172 miles and eases port congestion at New Orleans. Average annual traffic, 1979-1984, was 4,589,000 tons.

Atchafalaya Basin Floodway System

(New Orleans District)

This project, authorized by the Supplemental Appropriations Act of 1985 and the Water Resources Development Act of 1986, results from a comprehensive study to develop a plan for the

management and preservation of the water and related land resources of the Atchafalaya River Basin, Louisiana, which would include provisions for reductions of siltation, improvement of water quality, and possible improvements of the area for commercial and sport fishing. The features of the Atchafalaya Basin Floodway System are compatible with the current flood control plan, and include real estate acquisition of flowage easements and developmental easements over privately owned land in the floodway south of Krotz Springs, Louisiana, to ensure unhampered use of the floodway during major floods, and environmental easements over essentially the same land to protect the basin's environmental resources. Provision of additional public access and construction of several campgrounds, boat-launching ramps, and other recreational facilities are also included to allow public enjoyment of the area's unique environmental values. The system management unit feature involves making use of distinct hydrologies within the floodway to restore historical overflow conditions and thereby



The alligator — native of Louisiana swamps and marshes



Boating — a major recreational pursuit

enhance aquatic ecosystem productivity. The estimated total cost of the project (as of October 1986) was \$183,900,000, of which \$136,000,000 is Federal. Funds appropriated through FY 87 will be used for preparation of a real estate design memorandum and work necessary for acquisition of flood control easements. Acquisition of flood control easements is scheduled to begin in FY 88.

Lower Red River (Vicksburg District)

This project is a main stem feature of the MR&T project. It consists of about 60 miles of levees designed to prevent Mississippi River backwater from entering the alluvial lands south of the Red River and to protect against headwater floods on the Lower Red River. Improvements extend from Hotwells to Moncla along the right bank of Red River.

Bank stabilization works, including dikes and/or revetments, are being placed at locations where caving banks constitute a threat to the levee's integrity and where levee setbacks would be uneconomical. A surfaced road will be constructed for the entire length of the levee.

Some 47 miles of levee, about 78 percent of the total length, have been completed to final grade and section. The remainder, while incomplete to some extent, provides a high degree of protection. The estimated cost is \$34,200,000.

During 1956, the right bank levee, a local levee between Moncla and Lake Long, was rehabilitated to consistent grade and uniform cross section. The work was

accomplished under PL 84-99. Total cost was \$117,300, of which approximately \$39,000 was contributed by local interests. This particular section of levee is still maintained by local interests.

The Coulee des Grues Culvert is a triple 8- by 8-foot barrel-gated structure located in the embankment where Louisiana State Highway 1 crosses over Coulee des Grues. The structure closes a gap in the hills that extend from the WABPI to the south bank of Red River levees. The culvert was originally built by local interests in connection with construction of the highway. During periods of high water in the Red River backwater area, the structure is closed.

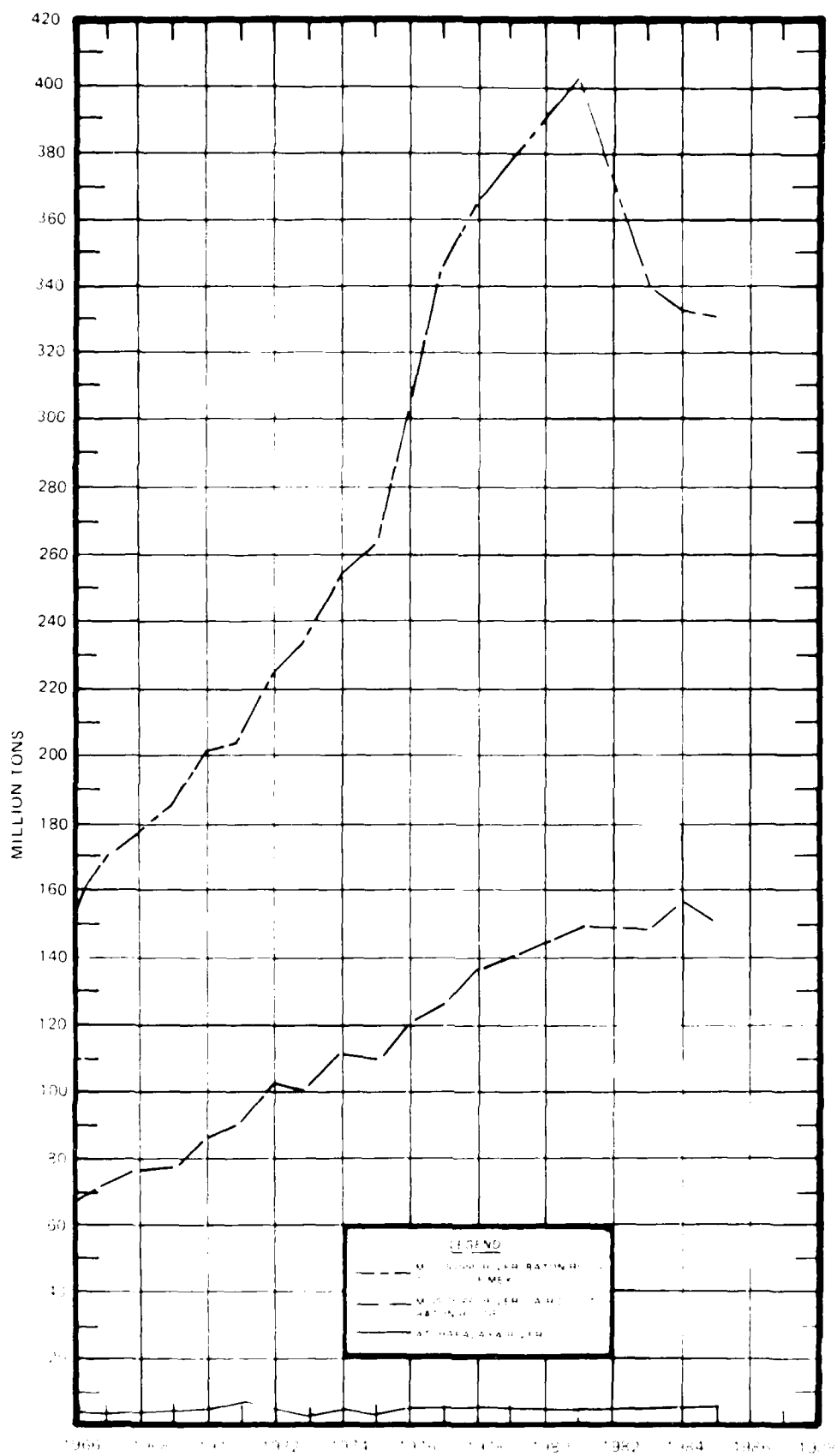
As originally constructed, the highway embankment was deficient in cross section required for a levee. Modifications consisted of extending the structure, installing manually operated gates, and enlarging the embankment. In 1954, the U.S. Army Corps of Engineers completed the modification at a cost of \$59,000. Maintenance of this feature is the responsibility of the Red River, Atchafalaya, and Bayou Boeuf Levee District.

Bayou Cocodrie and Tributaries (New Orleans District)

Authorized under the Flood Control Act of August 1941, this project provides for: construction of a 59.8-mile diversion channel from Bayou Rapides, west of Alexandria, to Bayou Courtableau above Washington; snagging and clearing of 2.2 miles of Bayou Boeuf; enlargement of 14.9 miles of Bayou Boeuf; enlargement of 15.3 miles of Bayou Cocodrie; and snagging and



Preparing for a crawfish boil



TRAFFIC ON MISSISSIPPI AND ATCHAFALAYA RIVERS



Atchafalaya Bay both natural and man-made marsh and higher ground

clearing of 10.0 miles of Bayou Cocodrie. Gated control structures are located at the head of the diversion channel and in Bayou Lamourie. A fixed-crest weir near Iecompte ensures equitable low-water flow in Bayou Boeuf.

The 1941 authorization is complete except for the enlargement of 13.5 miles of upper Bayou Boeuf and the channel improvement of 25.6 miles of Bayou Cocodrie. This work was delayed pending the provision of an adequate outlet at and below the lower end of the Bayou Cocodrie Diversion Channel. The uncompleted reach of Bayou Cocodrie has been designated as a natural and scenic stream under the State Scenic Stream Act.

Section 87 of the Water Resources Development Act of 1974 authorized the enlargement of Bayou Courtableau from the town of Washington to the WABPL, in lieu of construction of a previously authorized Washington-Courtableau Diversion Channel. Associated rights-of-

ways and excavated material areas will be provided at Federal expense. This act also authorized construction of additional culverts through the WABPL to provide for the increased flow. Detailed planning was initiated in fiscal year 1976 and is still in progress.

The estimated total cost of the project (as of October 1986) was \$26,900,000, of which \$19,800,000 is Federal. The Federal cost for work through September 1986, including the completed portion authorized in 1941, is \$4,899,000. The project, when complete, will reduce flood damages over an area of 61,700 acres. The prevented flood damages, as of October 1986, are estimated at \$8,307,000. The Red River, Atchafalaya, and Bayou Boeuf Levee District is responsible for maintenance and operation of all completed portions of the project except bridges for which the owners are responsible. The uncompleted features of the project and alternatives to these features are currently being developed.

Lower Atchafalaya River Basin Projects

In the Lower Atchafalaya River Basin, two navigation projects and one hurricane protection project have been authorized. These projects, described below, are not a part of the MR&I project.

Atchafalaya River and Bayous Chene, Boeuf, and Black (New Orleans District)

This waterway affords transportation for large offshore drilling equipment built by industries in the area and

for personnel and equipment servicing offshore drilling operations.

As authorized by the River and Harbor Act of 1968, the channel was constructed from the vicinity of U. S. Highway 90 at Bayou Boeuf to the Gulf of Mexico. The channel follows a route along reaches of the Gulf Intracoastal Waterway and Bayou Chene, through the Avoca Island-Cutoff Bayou drainage channel to the Lower Atchafalaya River, and from there through the existing project across the Atchafalaya Bay to the 20-foot depth contour in the Gulf of Mexico.

The channel is 20 feet deep with a bottom width of 400 feet, except in Bayou Boeuf where industrial development on both sides of the bayou necessitates a 300-foot-wide channel. The project includes a 20- by 400-foot channel constructed from the major shipyard on Bayou Black at U. S. Highway 90 through the Gulf Intracoastal Waterway to Bayou Chene.

The cost of the project is \$32,745,000 Federal, including \$13,000 for navigation aids, and \$1,896,000 non-Federal. Construction was initiated in April 1974 on the bay and Gulf reaches and was completed that same year. Construction of the Bayou Boeuf and Bayou Black portion was begun in 1977, and was completed in 1978. Construction of the Bayou Chene and Avoca Island cutoff reach was initiated in 1980 and was completed in 1981.

Mitigation for this project consisted of creation of marsh with material dredged during construction. Additional marsh will be created during maintenance dredging.

Atchafalaya River, Morgan City to Gulf of Mexico (New Orleans District)

Before 1954, traffic on the waterway consisted primarily of shells and averaged less than 500,000 tons per year. Since then, however, the burgeoning offshore oil industry has expanded traffic dramatically. Average annual traffic for 1979-1984 was 2,859,000 tons.

Authorized by the River and Harbor Act of June 1910, this project consists of a 20- by 200-foot channel, approximately 16 miles long from the 20-foot depth

contour in Atchafalaya Bay to the same contour in the Gulf of Mexico.

Traffic sufficient to warrant maintenance to current project dimensions did not immediately develop. Maintenance dredging provided a 10- by 100-foot channel in 1939, 1947, and 1948, a 14- by 125-foot channel in 1957 and 1958, a 16- by 200-foot channel in 1962-1966, and a 20- by 200-foot channel in 1974. Total costs have been \$501,963 for construction and \$10,706,845 for maintenance to date. The project will be superseded by the Atchafalaya River and Bayous Chene, Boeuf, and Black projects when completed.

However, in the interim the channel was modified to dimensions of 20 by 400 feet in 1974 under the new project. Total cost for maintenance of the modified project to date is \$12,048,282.

Morgan City and Vicinity Hurricane Protection (New Orleans District)

Features of this project include the construction of 9.2 miles of new levees, enlargement of 21.6 miles of existing levees, construction of flap-gated drainage structures and a floodgate, and alteration of 5 existing pumping stations and 11 drainage culverts.

The purpose of the project is to provide hurricane flood protection for developed residential, industrial, and commercial areas extending from the vicinity of Morgan City to the Charenton Drainage and Navigation Canal. The total value of improvements to be protected by the project is estimated at over \$117,500,000. Estimated first cost is \$42,700,000 of which \$27,700,000 is Federal, and \$15,000,000 is to be borne by non-Federal interests.



Award-winning Morgan City floodwall with decorative motif



Fishermen try their skill

Programs and Surveys

Flood Insurance Studies

Under the National Flood Insurance Act of 1968 (PL 90-448) and the Flood Disaster Protection Act of 1973 (PL 93-234), the Department of Housing and Urban Development (HUD) was authorized to establish and carry out a National Flood Insurance Program. The Federal Emergency Management Agency (FEMA) now has that responsibility. Upon request of FEMA, the Corps of Engineers conducts flood insurance studies.

In the Atchafalaya River Basin, insurance studies were completed in the following areas: Berwick, Melville, Morgan City, Patterson, Simmesport, St. Mary Parish, and Terrebonne Parish.

Surveys Authorized Or Under Way

Atchafalaya Basin (Includes Water and Land Resources Study) (New Orleans District) The Atchafalaya Basin study combines a general investigation (GI) study with a Phase I general design memorandum (GDM). The GI study, Atchafalaya Basin (Water and Land Resources), Louisiana, was authorized by resolutions of the Senate Committee on Public Works, dated 11 June 1968 and 23 March 1972, and by a 14 June 1972 Resolution of the House Committee on Public Works. The Phase I GDM was authorized in June 1976 under the discretionary authority of the Secretary of the Army acting through

the Chief of Engineers to address alternative plans for accomplishing the previously authorized purposes of the Atchafalaya Basin, Louisiana, project. Because of the interrelationships of the separately authorized studies, they were combined into a single study to develop a comprehensive multipurpose plan and environmental impact statement for the Atchafalaya Basin.

The primary goal of the combined study was to develop an implementable multipurpose plan that will protect southeast Louisiana from Mississippi River floods by ensuring safe passage of one-half the MR&T project design flood through the Atchafalaya Basin Floodway system, while retaining and restoring the unique environmental values of the floodway and maintaining or enhancing the long-term productivity of the wetlands and woodlands. To this end, the study addressed management measures for the operation of the Old River control structure; the safe conveyance of floodflows through, and reduction of sedimentation in, the Lower Atchafalaya Basin Floodway; the safe conveyance of the floodflows through the outlets to the Gulf of Mexico; the protection of the area east of the lower floodway from backwater flooding; and the protection or enhancement of fish, wildlife, and recreation resources in the lower floodway and project-affected areas.

As described under the existing project, guide levees have been provided at the eastern and western margins of the floodway. With the exception of the levees, the salient feature of the existing plan for the floodway is main channel training to accelerate the establishment of a well defined channel through the lower reaches of the flood plain, thereby minimizing the heights of the guide levees required to confine design flows and reducing the rate of loss of unique wetland habitat in the basin through siltation. The new plan was recommended in the Atchafalaya Basin Floodway system final report EIS, which was submitted to the Mississippi River Commission in January 1982, and approved by the Office of the Chief of Engineers on 28 February 1983. The recommended plan provides for: continued operation of the Old River control structure to maintain the authorized 70/30 flow division; continued construction of bank stabilization works above mile 55.0 on the main channel; modification of existing features, such as floodway guide levees, floodgates, pumping plants, etc.; further channel dredging only to the extent required for providing material to construct training works along the main channel that will achieve the desirable degree of flow confinement and natural channel enlargement from mile 90.0 to 116.0; construction of works to stabilize the present distribution of low to normal floodway outlet flows to approximately 70-percent/30-percent between the Lower Atchafalaya River and the Wax Lake Outlet, with possible future restriction of Wax Lake Outlet flows to about 20 percent depending upon ecosystem response; enlargement of the Wax Lake Outlet overbank area to allow passage of up to 50 percent of floodflows; realignment of the four principal distributaries of the main channel for sediment control; enlargement of the outlet channels by construction of training works along both channels below the latitude of Morgan City; construction of further extensions of the Avoca Island levee and/or other measures for backwater protection east of the floodway after

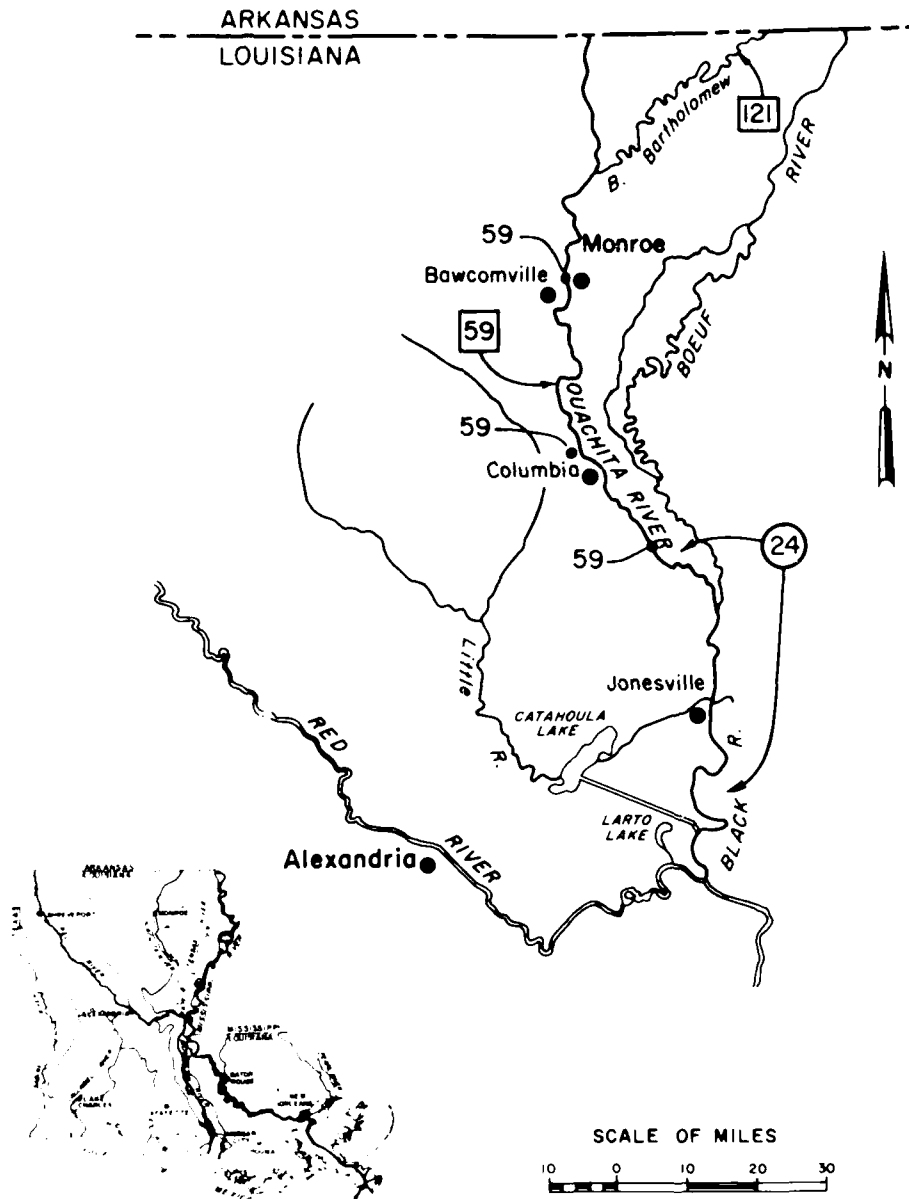
completing additional detailed studies of the bay-marsh-backwater complex; and construction of freshwater diversion structures for the Henderson Lake and Alabama Bayou areas. The previously described flood control features will be designed and constructed under the existing MR&T project authorization. The remaining features were authorized by PL 99-88 in 1985.

Current studies being conducted for the Atchafalaya Basin vicinity concern many topics. The engineering, biological, geological, hydrological, economic, and archeological investigations all center around specific project alternatives to prevent existing and anticipated flooding and environmental problems in the areas east and west of the floodway, and to optimize the anticipated growth of the Atchafalaya delta.

The current study is scheduled for completion in November 1989.

Berwick Lock, Atchafalaya River Basin (New Orleans District). The study will determine whether the replacement of Berwick Lock in the WABPL, St. Mary Parish, by a larger lock is justified in the interest of flood control, navigation, drainage, and other allied purposes. The study was initiated in 1976 and a Stage II report recommending suspension of the study was submitted in 1980. The study was placed in the deferred category in 1981.

Catahoula-Charenton Area (New Orleans District). This study was initiated in 1968 to determine the advisability of providing a navigation channel in the Atchafalaya Basin Floodway along the levee from the vicinity of Catahoula to Grand Bayou, and a navigation channel from Lake Dauterive to Bayou Teche via Lake Fausse Pointe and the Charenton Drainage and Navigation Canal. A completion date for the study has not been determined, since the study has been indefinitely suspended.



PROJECTS



NAVIGATION PROJECTS

24 Ouachita and Black Rivers (9-Foot Navigation Project) Arkansas and Louisiana



FLOOD CONTROL PROJECTS

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Ouachita River Basin

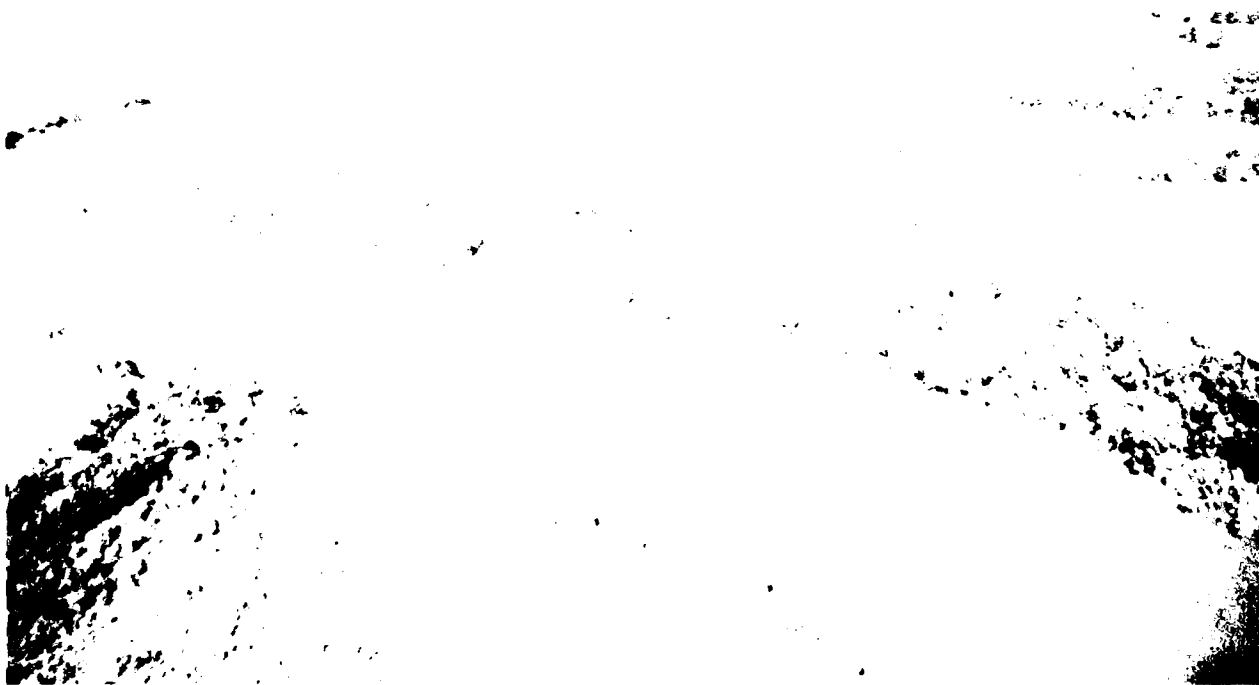
Ouachita River Basin

Introduction

The Ouachita River Basin, situated within portions of Arkansas and Louisiana, contains approximately 16,000 square miles. The Louisiana portion of the basin is bounded by the Arkansas-Louisiana state line on the north, by the Tensas River Basin on the east, by the Red River backwater area on the south, and by the Red River Basin on the west.

Where the Ouachita River crosses into Louisiana, the topography is characterized by level to slightly rolling bottomlands and terraces, known as the alluvial valley of the Mississippi River or the Mississippi Delta. The area is dissected by numerous swamps, lakes, and bayous. Bayou Bartholomew and Bayou D'Arbonne are the major tributaries of the Ouachita in Louisiana.

Early water resource developments in the Ouachita Basin by the Federal Government were limited to navigation improvements. However, after the 1927 flood, a number of flood control projects were authorized for construction. The various authorizations culminated in a comprehensive project for the entire basin. Varied improvements for navigation and flood control have been constructed or authorized. The development of a 9-foot navigation channel on the Ouachita River is the major project in the Louisiana portion of the basin. The Ouachita-Black navigation project and other Corps projects are described below. (Corps of Engineers projects in the Arkansas portion of the basin are described in the Arkansas Water Resources Development Booklet.)



Ouachita River



Columbia Lock and Dam

Projects

Ouachita and Black Rivers (9-Foot Navigation Project), Arkansas and Louisiana (Vicksburg District)

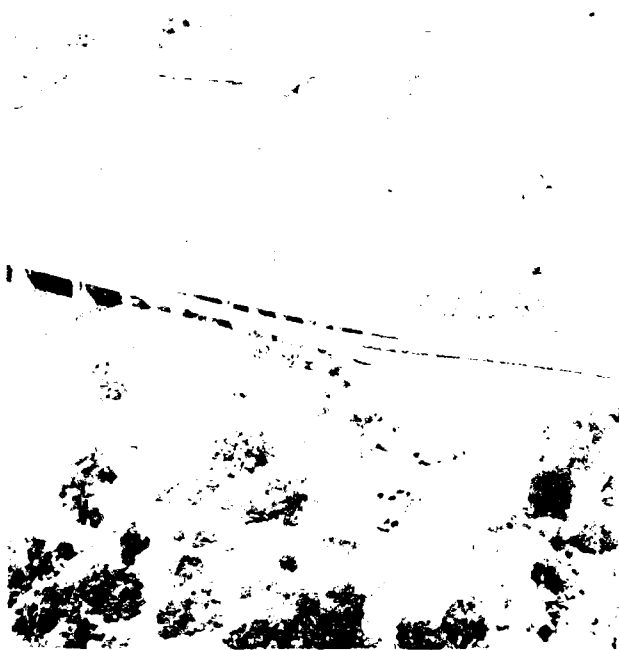
Improvement of the Ouachita-Black Rivers for navigation was first authorized in 1871 and consisted of snagging and clearing of the channel. Work on the original lock and dam project was completed in 1926, and provided a navigable depth of 6.5 feet from the mouth of Black River in Louisiana to Camden, Arkansas, a distance of 351 miles. In 1950, the original project was modified to increase the navigable depth to 9 feet, beginning at the mouth of Red River and extending to Camden, Arkansas, on the Ouachita River upstream from the Arkansas-Louisiana state line. With the use of four new locks and dams, the 9-foot navigation project makes possible the free interchange of river traffic between the Mississippi-Ouachita Rivers. In addition, the project includes improvements to increase area recreational opportunities and to benefit the fish and wildlife environment. The four new locks and dams replaced six obsolete structures. The Jonesville, Columbia, Felsenthal, and Calion locks and dams were placed in operation in June 1972. Each of the new locks is 84 feet wide and 600 feet long and impounds a slack water pool approximately 100 miles long. These locks will accommodate a tow consisting of four standard-sized barges, two abreast. Navigation improvements on the Ouachita in Louisiana also include channel enlargement and straightening and dredging, as necessary. The channel work is planned for completion in 1994.

Jonesville and Columbia Locks (Vicksburg District)

Fish and wildlife features of the Ouachita-Black navigation project in Louisiana include the Catahoula Diversion Channel and Control Structure, the Little River Closure Dam, and a refuge near Bayou D'Arbonne. The diversion channel and structure and closure dams, located in the Jonesville lock and dam pool southwest of Jonesville, have been constructed and are in operation. The channel diverts flows from Catahoula Lake into Black River, downstream from the lock and dam. The control structure is used to regulate the flow entering the diversion channel from the lake. The closure dam is located on Little River. These features allow for regulation of stages in the lake to permit its continued use as a resting and feeding area for migratory waterfowl. Upstream from Columbia lock and dam within the Columbia pool area, 18,000 acres of land along Bayou D'Arbonne have been acquired for use as a national fish and wildlife refuge.

Recreation facilities, including boat-launching ramps, parking areas, picnic tables, and cooking grates, have been provided by the Corps of Engineers in 17 areas along the Ouachita River. In 1983, 1.8 miles of pool opened these facilities.

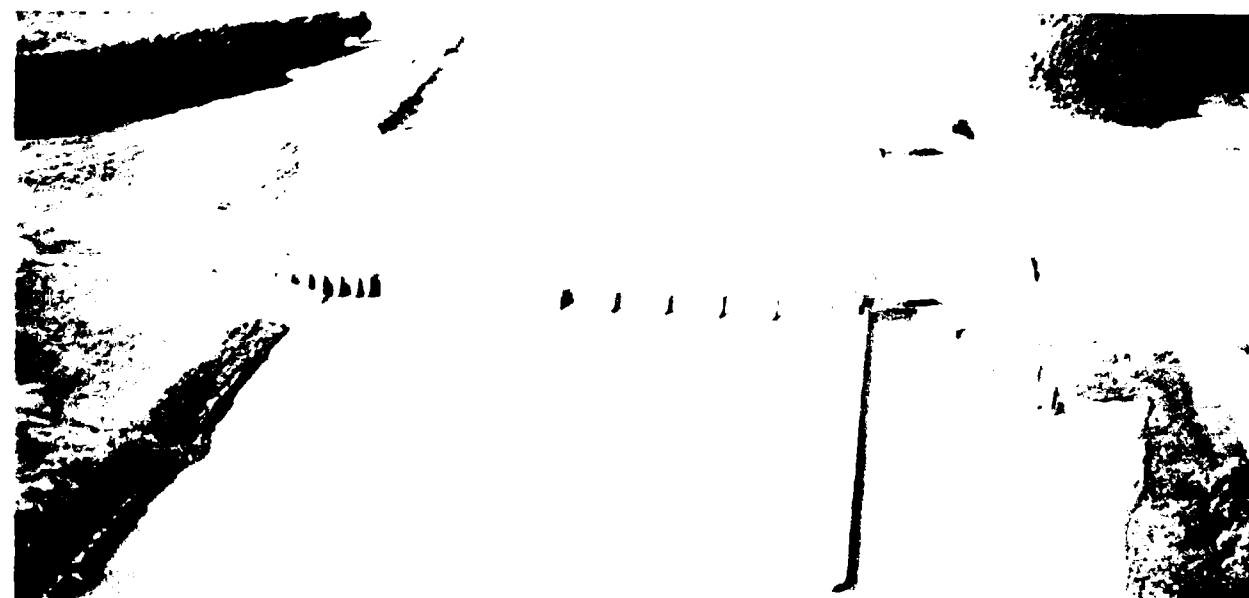
During 1978-1988, the Corps of Engineers completed 10 miles of channel work on the Ouachita-Black with over 1,000,000 cubic



City of Monroe



Riverside of floodwall



J. nesville Lock and Dam

The total estimated cost of this project, as of October 1984, was \$261,000,000.

Ouachita River and Tributaries, Arkansas and Louisiana

(Vicksburg District)

This project, authorized in 1950, is a comprehensive plan for flood control, power, and other improvements for the Ouachita River and Tributaries. The project provides varying degrees of flood protection to a large area of the Ouachita River Basin. An important feature of the project in Louisiana is the local protection provided to Monroe, West Monroe, Columbia, Bawcomville, and other areas, by the Ouachita River levees and associated local protection levees. The flood control features in Louisiana are described in the following paragraphs. (The Water Resources Development booklet for Arkansas discusses the project features located in that state.)

Ouachita River Protection Levees

(Vicksburg District)

The Ouachita River levees extend from Bastrop, along the south bank of Bayou Bartholomew and the east bank of the Ouachita River to the vicinity of Sandy Bayou, approximately 74 miles below Monroe. Protection levees and other improvements for Monroe, West Monroe, Bawcomville, and Columbia were also included in the Ouachita levees project. The levee at Monroe includes 1.9 miles of floodwall, with a unique 1,750-foot fold-down floodwall near the center portion. Construction of the fold-down section was completed in 1977. During periods when flooding is not a threat to Monroe, the fold-down section serves as a sidewalk and a place from which to view the river.

On the west bank of the Ouachita River, there are loop levees around West Monroe, Bawcomville, and Columbia. The West Monroe protection project consists of 5.5 miles of levee and 1.6 miles of floodwall. The local



Nature trails on Ouachita River

protection project at Columbia consists of 1.3 miles of levee with drainage structures, an outfall sewer with drainage facilities, floodgates, and a storm sewer and pumping plant. Bawcomville receives flood protection from the construction of a loop levee, pumping plant, floodgates, and associated ditches.

Flood damages prevented to date by the overall Ouachita River and Tributaries project amount to approximately \$880.4 million.

Bayou Bartholomew and Tributaries, Arkansas and Louisiana (Vicksburg District)

Bayou Bartholomew originates near Pine Bluff, Arkansas, flows through southeast Arkansas and northeast Louisiana, and empties into the Ouachita River just north of Sterlington, Louisiana.

The River and Harbor Act of May 1950 which authorized a flood control project for Bayou Bartholomew provided for channel improvement and

closure of highwater outlets on the main stem of Bayou Bartholomew, enlargement of Deep Bayou, and clearing and enlargement of Overflow Creek. The Flood Control Act of November 1966 amended the 1950 authorization and added ten flood retention lakes on the western tributaries of Bayou Bartholomew in Arkansas, and six local levee units for flood protection along the main stem in Louisiana. The amendment also included authorization for the purchase of 3,200 acres of land to mitigate fishery and wildlife losses that are expected to occur as a result of project construction.

The purpose of the project is to provide for a reduction of flooding on agricultural lands in Arkansas and Louisiana, improvement in the areas' recreational opportunities, and improvement in the fish and wildlife environment. The project was placed in the inactive category in 1979 because the project was not economically feasible. Renewed interest on the state and local level has occurred recently in the Arkansas portion of the project. The Louisiana portion of the project is not currently under review.

Programs and Surveys

Flood Plain Information Reports

Black Bayou (Vicksburg District). A special flood hazard information report was prepared for the area along Black Bayou in West Monroe, where residential and commercial properties are affected by flooding. The report was completed in 1973.

Monroe (Vicksburg District). A flood plain information

report was prepared for Monroe and Ouachita Parish for lands along 31 miles of the Ouachita River, in the vicinity of the city, and for lands along Youngs Bayou, Chauvin Bayou, and Bayou Lafourche. Lands affected by flooding include residential, commercial, and wooded areas. The report was completed in 1973.

West Monroe (Vicksburg District). A flood plain information report was prepared for the area

West Monroe and Ouachita Parish, for lands along 32 miles of the Ouachita River in the vicinity of West Monroe. The report directed attention to Ouachita River backwater flooding of residential and other areas.

Flood Insurance Studies

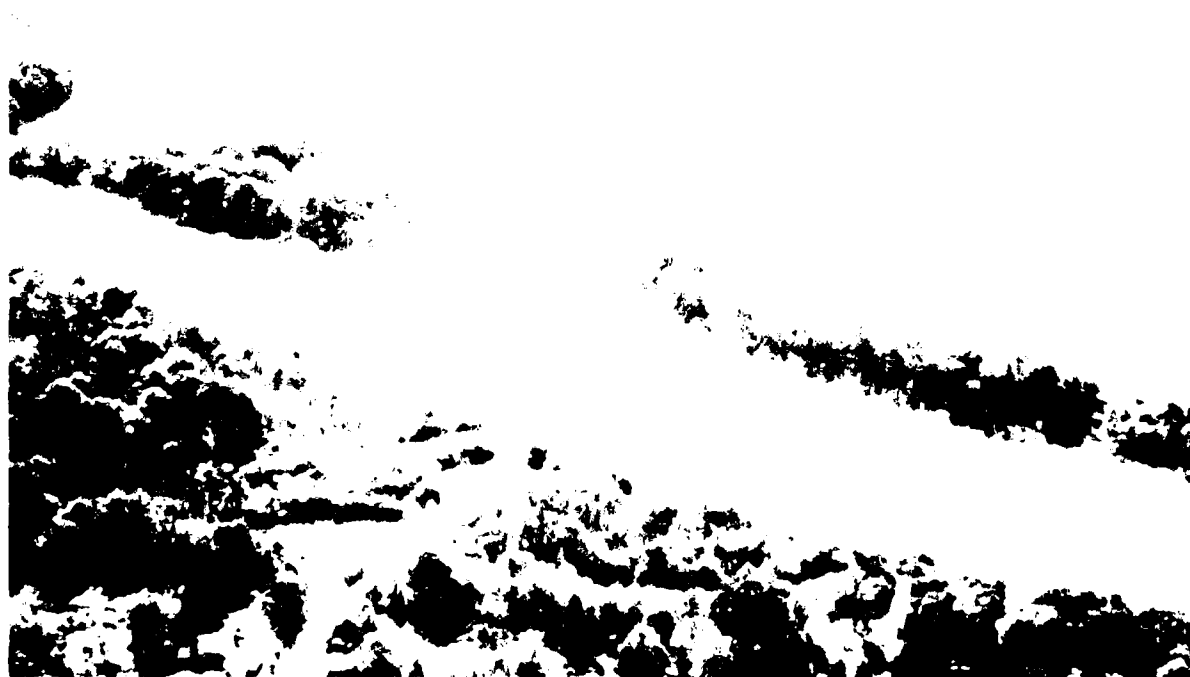
Flood insurance studies have been conducted by the Corps of Engineers for HUD in connection with the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The Federal Emergency Management Agency now has this responsibility. Studies have been completed in Louisiana for the following areas: Caldwell Parish, Columbia, Monroe, Ouachita Parish, and West Monroe.

Surveys Authorized or Under Way

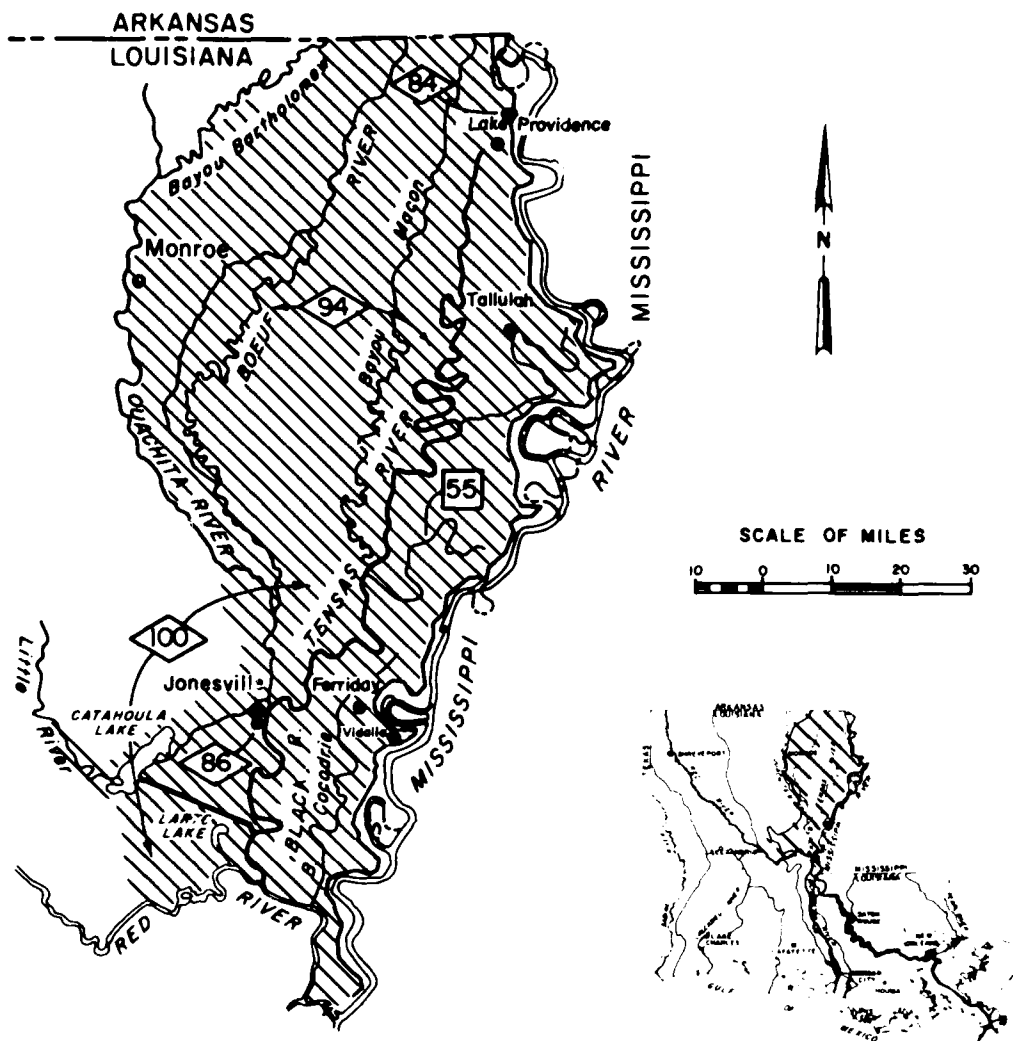
Ouachita River Basin (Vicksburg District). This is a comprehensive study of the entire Ouachita River Basin in Arkansas and Louisiana, an area of 16,000 square miles. It includes investigation of major water resource problems and needs. Two areas have been identified for early action study: the Ouachita River levee system and the Monroe-West Monroe area. A study of the Ouachita River Levee System to review the feasibility of completing this project was completed in August 1986. The report recommended that the Ouachita River Levees be constructed to the 1956 authorized project grade and that local interests perform the maintenance for the

project. Construction is contingent upon receipt of satisfactory assurances and subsequent to local interests initiating the maintenance work.

Studies of the Monroe-West Monroe area resulted in recommendations for projects in Chauvin Bayou and Youngs Bayou. The Chauvin Bayou report was completed in May 1987 and recommended construction of a 250 cfs pumping plant located adjacent to Chauvin Bayou at the Ouachita River Levee and a water control structure in Canal I-11. The recommended plan will reduce the average annual flood damages by 91 percent. The Youngs Bayou report was completed in February 1987 and recommended a plan for channel improvements to Youngs Bayou and bridge replacements in Pine Bayou which would reduce average annual flood damages by approximately 58 percent. The Chauvin Bayou and Youngs Bayou plans recommended for construction under authority of Section 205 of the Flood Control Act of 1948, as amended, provided local interests contribute their share of project costs and agree to operate and maintain the projects after completion. The reports are subject to Department of Army review and may be modified before approval for implementation funding. Other problems identified relate to water supply, bank stabilization, navigation, the development of hydroelectric power, flooding, and recreation. The study was initiated in 1976 and is scheduled for completion in 1989.



Bastrop Port



PROJECTS

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Tensas River Basin

Tensas River Basin

Introduction

The Tensas River Basin, located in southeast Arkansas and northeast Louisiana, is an extensive lowland area that lies to the west of the Mississippi River. That part of the basin located in Louisiana is bounded on the east by the Mississippi River main-line levee, by the Arkansas-Louisiana state line on the north, by the Ouachita River Basin on the west, and by the upper limits of the Atchafalaya River Basin on the south. The upper portion of the Louisiana sector is affected by headwater flooding from the Boeuf and Tensas Rivers and their tributaries. The lower section is subject to flooding from backwaters of the Mississippi and Red Rivers and headwater flooding from the Tensas and Ouachita Rivers. At about the latitude of Vicksburg, Mississippi, the basin widens to approximately 80 miles. Farther

south, near Sicily Island, Louisiana, the area constricts to about 20 miles, then widens in the lower section near Catahoula Lake. The major tributaries of the Tensas River include Boeuf River, Bayou Macon, and Bayou LaFourche.

The lower sector of the Tensas River Basin in Louisiana contains the large area known as the Red River backwater area. This region extends from the Mississippi River about 40 miles westward to the hills by Catahoula Lake. It stretches southward to the Atchafalaya Basin, including the below Red River area, and northward and upstream on the Ouachita-Black and Tensas Rivers and their tributaries to the limits of backwater overflow.



Big Creek at Interstate 20



Tensas-Cocodrie backwater area

Projects

Boeuf and Tensas Rivers and Tributaries, Arkansas and Louisiana (Vicksburg District)

This project is located in the States of Arkansas and Louisiana, in the large alluvial flood plain of the Mississippi River. The area is protected from Arkansas and Mississippi River floods by the south bank Arkansas River levees and the west bank Mississippi River levees.

The purpose of the project is to provide a high degree of protection against headwater floods in both Arkansas and Louisiana, improving recreational opportunities for Lake Chicot in Arkansas.

Water resource improvements in this project constructed to date in Louisiana include channel clearing, snagging, realignment, and enlargement. Upon completion of the project, a total of 922,000 acres (including Lake Chicot) will be substantially benefited by the flood protection provided. Improvements constructed or authorized in the Arkansas portion of the basin are described in the Water Resources Development Booklet for Arkansas.

Improvements on the Boeuf and Tensas Rivers and their major tributaries were near completion in the late 1980's when the entire project was reviewed to determine if additional improvements were needed. Development in the basin indicated a need for additional water resource improvements.

The authorized additional improvements in the Boeuf and Tensas River Basin called for approximately 75 miles of channel improvements on Big and Colewa Creeks, 38 miles of channel improvement on Bayou Lafourche, 160 miles of channel improvement on Tensas River, and about 6 miles on the lower Boeuf River. Work was completed on the Boeuf River, the lower 40 miles of Big and Colewa Creeks, and the lower 61 miles of the Tensas River.

Concern expressed by citizens in the lower portion of the basin over additional flooding in their area, especially Franklin Parish, as a result of the project, resulted in halting any additional work until a reevaluation of the authorized project could be completed.

A postauthorization study of Tensas River Basin (Excluding Bayou Macon, Louisiana) was undertaken to review the authorized project to determine the best method to provide flood protection for the 1,041 square miles of drainage above Mile 61 on the Tensas River. The authorized project in this area includes additional channel improvements from Mile 61 to Swan Lake in East Carroll Parish and channel enlargement on the lower 18 miles of Middle Bayou Bayou, a tributary of the Tensas River.

Environmental concerns associated with the project have been taken into account in the development of the project. The project is designed to provide flood protection

untenable. Therefore, an alternative involving a minimum work reach on the Tensas River between U.S. Highway 1-20 and the confluence of Mill Bayou has been formulated to minimize the direct losses of hardwoods through clearing in the right-of-way. A greenbelt has been included along the channel to reduce channel sedimentation, improve the esthetics, and reduce environmental impacts of the projects.

This plan has been formulated to be completely compatible with the Tensas River National Wildlife Refuge (50,000 acres) which was enacted into law in 1980. The study was completed in 1980. Work is now underway on the Phase II Engineering Report, which is scheduled for completion in October 1988.

The reevaluation of the authorized work on the Boeuf River and its tributaries was begun in 1978. Preliminary studies completed in 1979 indicated that the complexity of the flood problems in the area and the interrelationships of various streams and other projects required a comprehensive study to determine the best solution to the overall problem. Possible solutions were being investigated in the Boeuf River and Tributaries Interim Study of the Boeuf-Tensas Basin Study. Because of public opposition to an element of the selected solution, the local sponsor withdrew sponsorship of the project. The interim study was terminated in 1985.

The estimated total cost of this project is \$182 million, which includes costs of \$96 million for the Lake Chicot Pumping Plant and associated work. Estimated flood damages prevented by this project through fiscal year 1984 were \$87.4 million.

Red River Backwater Area (Vicksburg District)

The Red River backwater project provides protection to large areas in east-central Louisiana from the effects of backwater flooding from the Mississippi, Red, Ouachita, and Black Rivers. The project provides protection to these areas from lesser floods, but these lands must remain subject to use for storage of floodwaters during a Mississippi River Project Flood. The Flood Control Act of 1928 with subsequent amendments authorized the Corps of Engineers to construct levees and other improvements in the backwater areas. A total of 588,000 acres benefit substantially from the project. The authorizations provide for four major levee projects and several smaller projects. The four major projects affect the following areas: Tensas-Cocodrie area, Larto Lake to Jonesville area, Sicily Island area, and the below Red River area.

Tensas-Cocodrie Area. The Tensas-Cocodrie levee and associated improvements in Concordia Parish provide flood protection to 373,000 acres. A pumping plant has been built for this area to remove accumulated rainfall from the lower portion of the area when the existing gravity drainage structures are used. Channel excavation on West Cane River, the main artery of construction, will increase the capacity of the Tensas-Cocodrie Pumping Plant to 1,000 cfs. A major structural improvement in the area is the construction of a 198-ft-long, 12-ft-deep, 12-ft-wide concrete structure to improve the flow of water from the area.



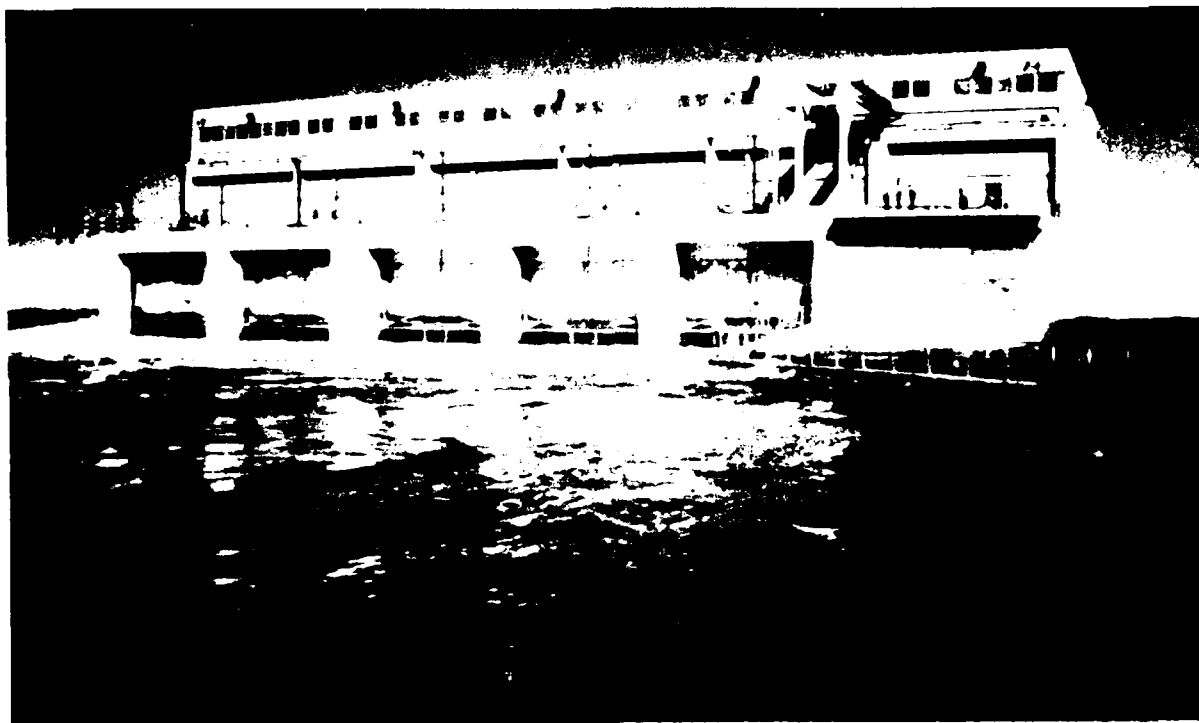
Tensas River National Wildlife Refuge

Tensas River National Wildlife Refuge has mitigated the fish and wildlife losses. Several structural mitigation features are also included. Two water control structures were awarded in May 1987 and three boat ramps are scheduled for construction in 1989. Estimated total cost for the Tensas-Cocodrie Pumping Plant and associated works is \$55,500,000.

Flooding in 1973 made necessary a redesign of levee grades in the Red River backwater area. These new levee grades called for enlargement of the Tensas-Cocodrie levee system. This work was initiated in 1977 and completion of the work will occur in an orderly sequence over the next four years.

Larto Lake to Jonesville Area. Levees and associated improvements that protect about 104,000 acres within the Larto Lake to Jonesville area (located north of the Catahoula Lake Diversion Canal in Catahoula Parish) were completed in 1978. To mitigate fish and wildlife losses that resulted from construction of this project, the Corps of Engineers purchased 12,800 acres of land in the Red River backwater area. These lands are important to the habitat of the Louisiana Department of Wildlife and Fisheries. Plans are under way to develop a project to improve the habitat of the area. The project will include the construction of a 198-ft-long, 12-ft-deep, 12-ft-wide concrete structure to improve the flow of water from the area.

Sicily Island Area. The Sicily Island area is located in the Red River backwater area. The area is protected by a levee system. The project will include the construction of a 198-ft-long, 12-ft-deep, 12-ft-wide concrete structure to improve the flow of water from the area.



Texas-Cocodrie pumping plant

drainage structures and associated work. These studies examined various alternatives in an effort to select an acceptable plan which would meet local and national objectives.

A recommended plan was submitted, and final approval was granted in 1980. Item 1-A was completed in 1984, and final completion of all items is planned for 2010.

Below Red River Area. The below Red River area, located east of Marksville in Avoyelles Parish, was also authorized for water resource improvements, including a levee, channel improvement, drainage structures, a pumping plant, and associated works. Various alternatives were analyzed in an effort to select the plan suitable for meeting local and national objectives.

The Phase I General Design Memorandum recommended a project, and the MRC granted approval in 1981.

Phase II plans are currently being made. Until the federal administration grants approval of the project as a separable element, no construction date will be set.

Little River Area. Initial work authorized for the Harrisonburg to Little River area northwest of Jonesville in Catahoula Parish is complete. Improvements consist of a levee on the west bank of the Ouachita River and minor drainage ditches. This work provides only a partial protection from intermittent floodwater flowing into the Ouachita River. The Bushy Bayou project, authorized for additional levee and associated work, is currently under study. The proposed project would provide protection for the Harrisonburg and Little River areas. Bushy Bayou is a tributary of the Ouachita River.

The total estimated cost for the Red River backwater project is \$169,700,000. New project plan costs for the Sicily Island and below Red River areas are reflected in the overall Red River backwater cost shown above. To date, \$42.3 million in damages have been prevented by Red River backwater project improvements.

Small Projects

Big Choctaw Bayou (Vicksburg District). The Big Choctaw Bayou project, completed in 1965, consists of improvement of the channel on the bayou between the mouth (Mile 0) and Mile 35. The work provides an outlet for a system of drainage improvements constructed by local interests. Local interests furnished the rights-of-way and constructed the lower 17 miles of the project.

Grant's Canal (Filling) (Vicksburg District). During the Civil War, Gen. Ulysses S. Grant had his troops excavate a short canal in the town of Lake Providence in an attempt to bypass Confederate fortifications at Vicksburg, Mississippi. Grant planned to move gunboats and transports from the Mississippi River into Lake Providence, down the Texas River, and cross over to St. Joseph on the Mississippi River. In 1953, a remaining segment of the canal was filled to return the area to its natural state.

Jonesville (Vicksburg District). Jonesville, Catahoula Parish, is situated on the Red River, a major tributary of the Mississippi River. The town is located on a narrow strip of land between the Red River and the Ouachita River. The town is surrounded by water on three sides. The town is located on a narrow strip of land between the Red River and the Ouachita River.

the city from headwater floods on the Ouachita-Black Rivers and backwater flooding from the Mississippi and Red Rivers. The improvements consist of levees, floodwalls, two surface drainage structures, a storm

sewer, a storm drainage pumping plant, and an outlet ditch. Estimated flood damages prevented by this project to date are \$6,683,000.

Programs and Surveys

Flood Plain Information Reports

Concordia Parish (Vicksburg District). A special flood hazard information report was prepared for Concordia Parish in 1973. The parish is affected by floodwaters of the Mississippi and Red Rivers and their tributaries. This area is similar to the Tensas-Cocodrie leveed area. The report indicates that flooding occurs primarily on residential and agricultural properties.

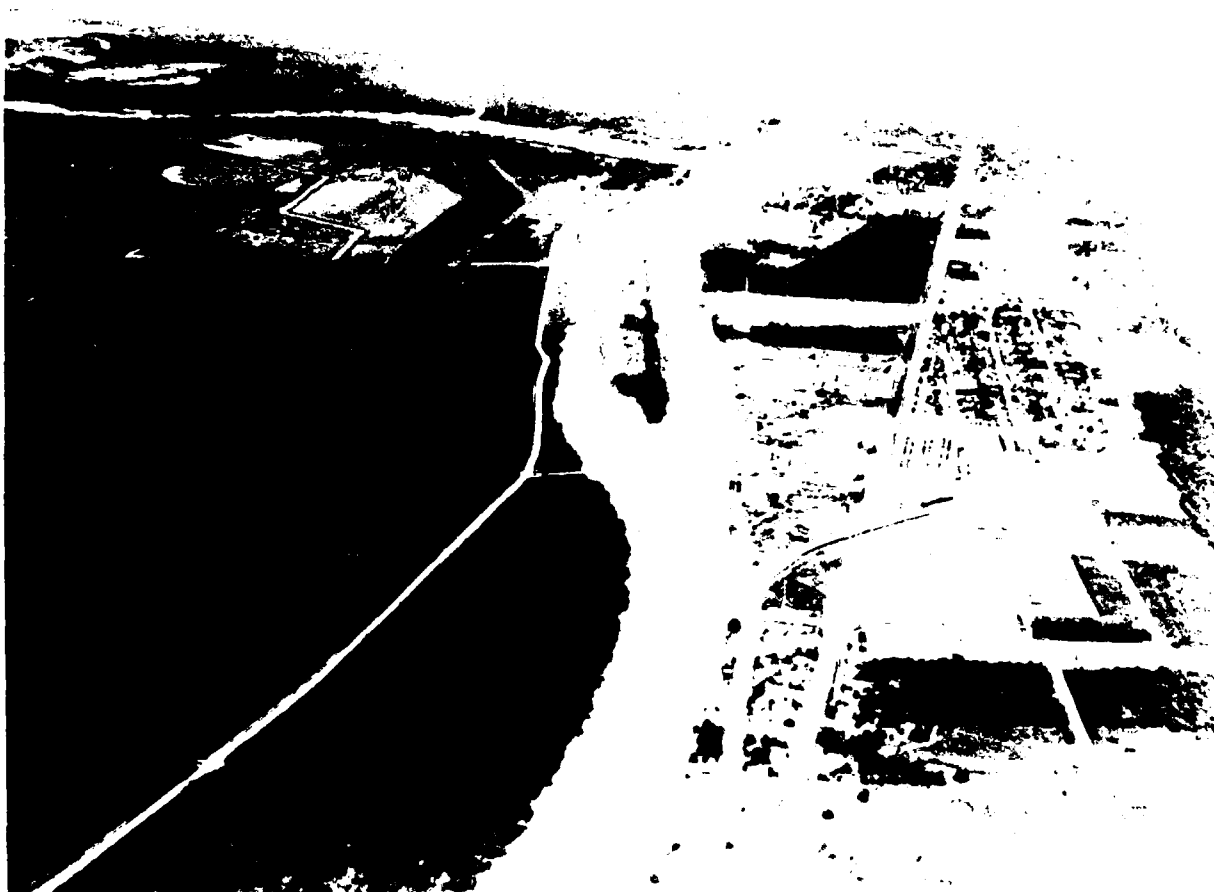
Flood Insurance Studies

The Corps of Engineers has conducted a number of flood insurance studies for the HUD in connection with the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The Federal Emergency

Management Agency (FEMA) now has that responsibility. Insurance studies completed for cities and parishes in the Louisiana portion of the Tensas Basin include: Clayton, Concordia Parish, Ferriday, Ridgecrest, Tensas Parish, Vidalia, and Winnsboro.

Surveys Authorized or Under Way

Boeuf-Tensas Basin, South Arkansas and North Louisiana (Vicksburg District). This study area includes the entire Boeuf-Tensas Basin in southeast Arkansas and northeast Louisiana, an area of about 9,000 square miles of Mississippi alluvial valley land. This comprehensive study will result in a coordinated water and related land resources management plan for the basin. Problems and



Bayou Boeuf Lock

needs to be investigated include flood damage reduction, bank stabilization, water supply, water quality, navigation and harbor facilities, recreation, fish and wildlife, and other measures for the protection and enhancement of the environment. The study was initiated in 1979. The Boeuf River and Tributaries interim study has been terminated due to local opposition to the selected plan. However, there is consideration being given to further study investigation depending on commitments from local interests. The final basin-wide report is scheduled for completion in 1989.

Larto Lake-Saline Lake (Vicksburg District). A Reconnaissance Report was completed August 1980. This report concluded that further studies were warranted. Upon further detail analyses and evaluations, primary sources of turbidity creating unfavorable conditions for fishery and other recreational related

activities were identified and several locations for a diversion weir and gated structures were evaluated. The Louisiana Department of Wildlife and Fisheries (LDWF) during the period of this phase sought and obtained permits for implementing improvement measures. Although these measures to date have had limited success, LDWF still are looking at additional measures to improve the situation of these lakes. A summary report on this study is scheduled for completion in 1987.

Walnut-Roundaway Bayou (Vicksburg District). This study will determine an economical method of providing flows in the bayou, so that water will be available for irrigational, recreational, industrial, municipal, and other uses. The study, funded in 1979, has been incorporated into the Boeuf-Tensas Basin study.

Red River Basin

Introduction

The Red River, more than 1,200 miles long, is a major tributary of the Mississippi. Throughout the years, the allure of Red River has compelled the literary interest of writers and lyricists. Yet in the past, the Red River has also had the typical difficulties of an alluvial stream, complicated by erratic flow and a sandy flood plain soil. Well-documented accounts of the incredible Red River rafts of the 1800's are a part of the history of the area.

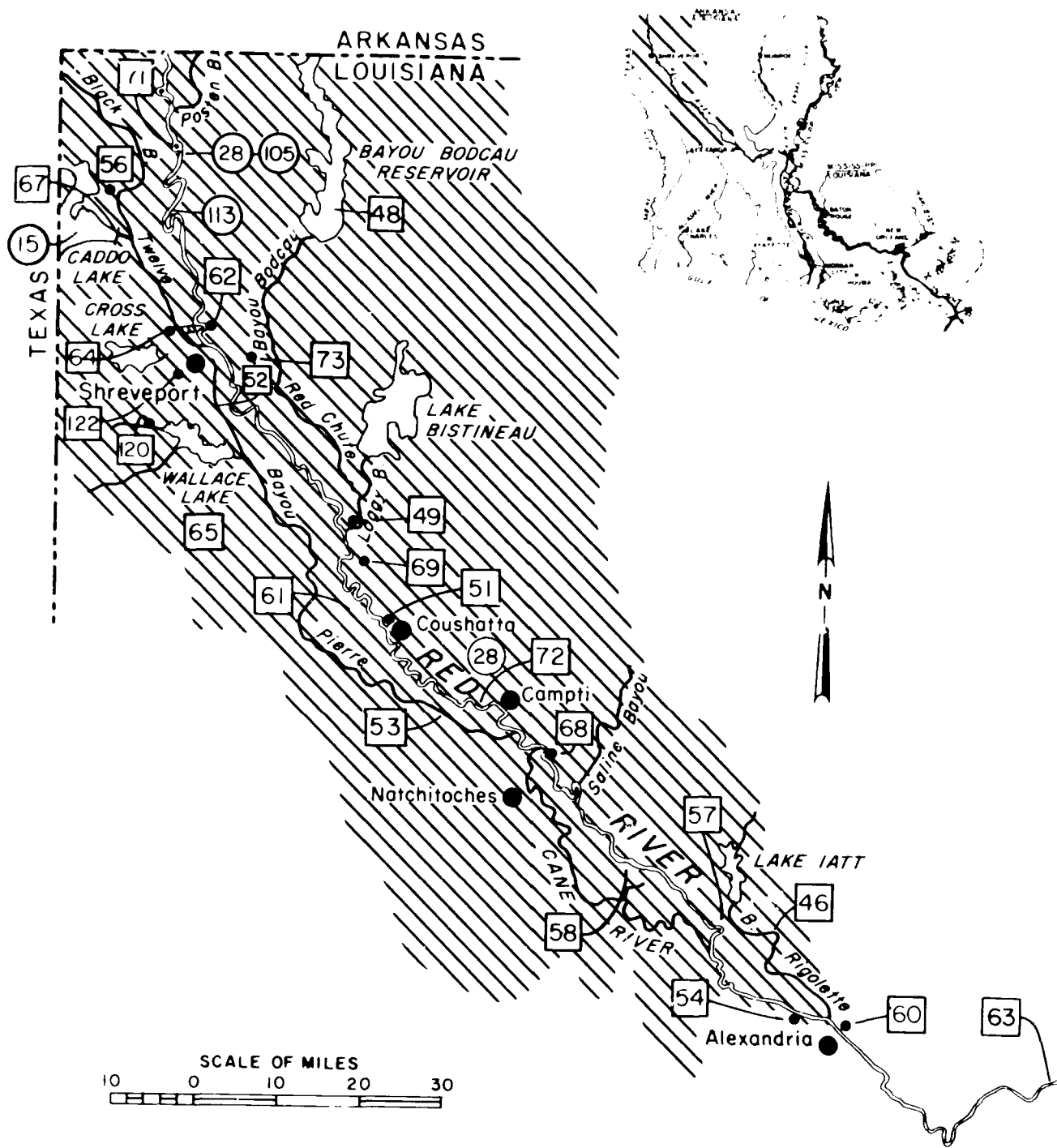
Improvements during the 19th century, made under small appropriations and limited conceptions, did not cure the difficulties in the river and its valley. A new, broader approach came with the 20th century.

concept of developing a whole river valley in an integrated manner with comprehensive basin planning.

Today, the Red River Basin in Louisiana, above Alexandria, with its varied improvements for flood control, bank stabilization, and navigation, constitutes one of the best potential areas for regional development. Many improvements are complete, and many more are authorized. The Red River Below Denison Dam Comprehensive Basin Study was completed in 1960, assuring that optimum development of the basin can be accomplished.



Bridges at Alexandria



Red River Basin

Red River Basin

PROJECTS



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Projects

Armistead Bank Protection

(Vicksburg District)

To prevent further caving of the right bank of Red River above the Armistead-Coushatta highway bridge across Red River, a standard board revetment was constructed above the bridge in 1951. It was extended upstream in 1952 and in 1954 at a total cost of \$380,289.

Accomplished under the provisions of Section 14 of the Flood Control Act of 1946, this project protects about 4,800 linear feet of bank. Maintenance of the completed improvements is the responsibility of the Red River Levee and Drainage District.

Bayou Nicholas and Coushatta

(Vicksburg District)

The improvement consists of a ring levee for the protection of Coushatta. The levee extends from the hills to the high bank along Red River, about one-half mile upstream from the U. S. Highway 84 bridge. A second levee commences about 0.5 mile below the bridge and continues downstream along the river for 0.5 mile, then easterly to the Kansas City Southern Railway tracks.

Outlet for the local drainage is through a gated culvert in each levee. This project was authorized under Section 205, Flood Control Act of 1948. Completed in 1964, the project cost the Federal Government \$70,700.

Maintenance of the completed improvements is the responsibility of the Red River Levee and Drainage District.

Bayou Rapides

(Vicksburg District)

This project, authorized under Section 205 of the Flood Control Act of 1948, consists of 22.6 miles of snagging, clearing, and chemical treatment of the stumps. Work

was completed in 1951 at a cost of \$95,179. Cumulative benefits from flood damage prevented through September 1983 are estimated at \$408,000. Maintenance is the responsibility of the Red River, Atchafalaya, and Bayou Boeuf Levee District.

Black Bayou-Pine Island Area

(Vicksburg District)

Authorized under Section 205 of the Flood Control Act of 1948, this project consists of about 7 miles of levees along the right bank of Black Bayou and a drainage structure for discharge of interior runoff. The project affords the Pine Island oil field protection against floods on Twelvemile and Black Bayous, which occur about once in 25 years. The project was completed in 1963 at an estimated Federal cost of \$336,063. Maintenance of the completed project is the responsibility of the Caddo Levee District. Cumulative benefits attributable to the project through September 1982 are \$1,250,000.

A crevasse approximately 1,500 feet above the levee's downstream terminus occurred during heavy rains in April 1966, resulting in flooding of a large portion of the oil field which it protects. The crevasse occurred without warning and no preventive work could be accomplished. The levee was repaired at a cost of about \$28,000.

Brush Bayou

(Vicksburg District)

Under the authority of Section 205 of the Flood Control Act of 1948, as amended, a plan has been developed for channel enlargement and realignment of this stream, between Mile 1.20 and 7.42, in combination with nonstructural measures for flood plain management. A portion of the project between Mile 1.20 and Mile 5.86 was completed and turned over to the Caddo Parish Police Jury for maintenance in 1978. The remaining



Campers enjoy a summer afternoon along Louisiana lakes



Colfax

portion between Mile 5.86 and Mile 7.42 was completed by the Office of Public Works and the Caddo Parish Police Jury. Construction of the project was initiated in 1976. The Federal cost of the project is \$1,000,000, and the non-Federal cost is \$2,480,000.

Caddo Lake, Replacement of Dam
(Vicksburg District)

Replacement of the existing dam was authorized by the Flood Control Act of October 1965. The new dam, located immediately downstream of the existing structure, has the same flow characteristics as the existing dam.

The continued existence of Caddo Lake, used for municipal and industrial water supply and recreation, is now ensured. Completed in 1971, the dam consists of 2,400 linear feet of concrete wall, with the central 860 feet of crest at elevation 168.5 feet NGVD and the remaining 1,540 feet at 170.5 feet NGVD. An earth embankment 1,200 feet long ties the concrete dam to the hill line at one end; at the opposite end, the dam abuts the hill line.

The Federal cost of the project through June 1976 was \$3,586,000. The non-Federal cost was \$228,000. The Water Resources Development Act of 1976 transferred the operation and maintenance of the dam from local to Federal responsibility.

Colfax Cutoff
(Vicksburg District)

The Colfax Cutoff was made to stop caving banks along Red River and to protect the town of Colfax. This

emergency channel improvement was completed in 1936 at a cost of \$148,282, and was enlarged in 1939 at a cost of \$70,348.

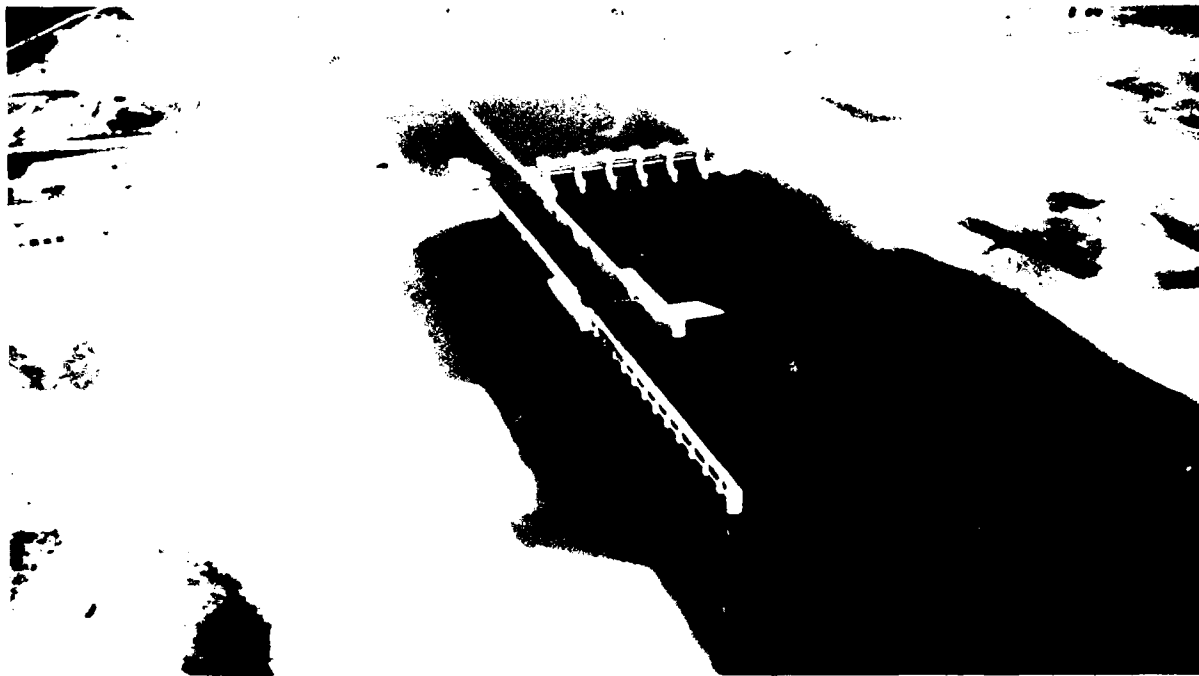
Coushatta Bank Protection
(Vicksburg District)

The north approach to the Armistead-Coushatta highway bridge is protected by 1,136 linear feet of standard board revetment on the left bank of Red River. Constructed in 1950 under Section 14, Flood Control Act of 1946, this improvement cost \$90,276, with the Federal Government contributing \$50,000 and local interests contributing the balance.

Cypress Bayou and Waterway Between Jefferson, Tex., and Shreveport, La.
(Vicksburg District)

This project provides for removing obstructions, dredging, and straightening the channel from Jefferson, Texas, to Shreveport, Louisiana, a distance of 66 miles, and the construction of a dam, without a lock, at the foot of Caddo Lake. The project was completed in 1914 at a cost of \$202,817. A new dam has since been built to replace the original one.

Privately owned, except for Caddo Lake State Park, the 170-mile shoreline of Cypress Bayou offers excellent recreational opportunities. Commercial camps operating along the shoreline provide cabins, boats, fishing, hunting, and other recreational facilities. Owners of hundreds of homes and private camps also take advantage of recreational opportunities along the waterway.



Lock and Dam 2

Visitors to the waterway number from 500,000 to 1,000,000 annually. The variation is due to heavy aquatic vegetation, which in low-water years sometimes completely covers large areas of upper Caddo Lake. The 26,800-acre lake and Cypress Bayou below Jefferson have an average depth of 4.8 feet. No commerce has been reported since 1979, which was 19,187 for that year.

The project was also modified by the River and Harbor Act of 1968, to become part of the Red River Waterway project.

Fire Point Cutoff and Revetment (Vicksburg District)

This emergency channel improvement project in Caddo Parish, near Benton, was completed in 1936 at a cost of \$124,178. The construction of 1,650 linear feet of board revetment at this location was completed in 1950 at a cost of \$104,632.

Gahagan Bend (Vicksburg District)

Bank protection works under this project consist of three pile dikes in Red River, near the town of Gahagan, to protect the flood control levee and avoid relocating a paved highway and main-line railroad. The original work (done under the provisions of Section 14 of the Flood Control Act of 1946) was completed in 1948 and strengthened in 1951 at a cost of \$201,966. It protects approximately 2,700 linear feet of bank.

Lucas Bend (Vicksburg District)

Bank protection works on Red River under this project consist of articulated concrete mattresses, 4- by 4-foot steel fascine boxes placed on dredged sand till, and pile

dikes at Lucas Bend, about 9 miles below the city of Shreveport. Authorized under Section 14 of the Flood Control Act of 1948, this project protects the flood control levee and makes unnecessary the relocation of the main line of the Texas and Pacific Railroad, a paved highway, and a 12-inch gas pipeline. Approximately 4,750 linear feet of bank have been protected at a cost of \$641,676.

Moncla Bridge (Vicksburg District)

Protection for the left bank approach to the Louisiana State Highway 107 bridge over Red River at the town of Moncla is provided by 1,900 linear feet of standard board revetment. This bank protection work was completed in 1953 (under the provision of Section 14 of the Flood Control Act of 1946) at a cost of \$117,671. The Federal Government contributed \$50,000 and local interests contributed the balance.

Overton-Red River Waterway (Vicksburg District)

This project was authorized in 1946 as a modification of the project "Red River Below Fulton, Arkansas," described subsequently. Under the modification, a 9- by 100-foot navigation channel was to be constructed from the Mississippi River via Old and Red Rivers for a distance of 31 miles, then through a new land cut generally along existing streams on the right bank of the Red River flood plain to a turning basin on Bayou Pierre at Shreveport. The project, which is about 205 miles long, would have nine locks, a pumping plant, and numerous control structures.

Surveys and preliminary studies were suspended in 1961 because local interests would not agree to cooperate with

the project. The Louisiana constitution was amended in 1965 to authorize formation of the Red River Waterway District. This district furnished an acceptable act of assurance of local cooperation for the lower 31 miles of the waterway in 1967. Planning was resumed in 1965 on that part of the project.

Construction of the project, with channel dimensions of 9 by 200 feet, was initiated in 1968. Authorization of the Red River Waterway project eliminated the need for the Overton-Red River Waterway above Mile 31. For this reason, that portion above Mile 31 was placed in an inactive status in 1971. See "Red River Waterway, Louisiana, Arkansas, Oklahoma, and Texas," discussed subsequently. Completion funds for the lower 31 miles of the project were received in fiscal year 1982, and that portion of the project was completed in fiscal year 1982 at a Federal cost of \$26,654,000 and non-Federal cost of \$52,000. The lower 31 miles was subsequently incorporated into the Red River Waterway, Mississippi River to Shreveport, Louisiana, Project.

Red River Below Denison Dam, Texas, Oklahoma, Arkansas, and Louisiana

(Vicksburg and Tulsa Districts)

A comprehensive plan for flood control in the Red River Valley below Denison Dam was authorized by the Flood Control Act of 1946 and subsequent modifications. The plan provides for the construction of Boswell, Hugo, Pine Creek, Tuktata, and Broken Bow Reservoirs in Oklahoma; Millwood, DeQueen, Gillham, and Dierks Reservoirs in Arkansas; and Cooper Lake, Wright Patman Lake, and Lake O' the Pines in Texas.

The project also includes enlarging and strengthening the Red River levee system, constructing channel stabilization and bank protective works where levee setbacks are impossible or uneconomical, constructing several local protection projects, and incorporating several previously authorized projects into the comprehensive plan.

This project has been modified by the Red River Waterway Project, authorized by the River and Harbor Act of 1968. Because of the wide scope of the project, its various features are treated as separate projects, as listed in the following table.

Aloha-Rigolette Area, Grant and Rapides Parishes

(Vicksburg District). Aloha-Rigolette area, Grant and Rapides Parishes, is a flood control project authorized in 1941 as an extension of the previously authorized and completed project, Grant Parish Below Collax. These improvements are designed to prevent flooding of Collax and fertile alluvial agricultural lands lying along the left bank of the Red River. Interior drainage improvements were also made.

Included in the project are: enlargement of 9.2 miles of levee, construction of 12.1 miles of new levee, including closure of Bayou Darrow, to extend the levee to the hills on the left bank of Bayou Rigolette; a floodgate in Bayou Rigolette; diversion of Bayou Darrow to Saline Bayou, approximately 31 miles of snagging and clearing

RED RIVER BELOW DENISON DAM—NEW AND INCORPORATED PROJECTS

Feature	Status	See State Booklet*
New Projects		
Arkansas		
DeQueen Reservoir		Ark.
Dierks Reservoir		Ark.
Gillham Creek		Ark.
Gillham Reservoir		Ark.
Millwood Bayou		Ark.
Millwood Reservoir		Ark.
Pine Creek Bayou		Ark.
Walden Bayou		Ark.
Arkansas and Louisiana		
Dierks Creek and Tributaries	Authorized**	Ark.
McKinnon Bayou	Planned	
Louisiana		
Cadeau Dam Replacement	Completed	
Camp Grant and Tributaries	Completed	
East Point Levee	Completed	
West Azard Levee	Completed	
Oklahoma		
Boswell Reservoir		Okl.
Broken Bow Reservoir		Okl.
Brown Creek		Okl.
Hugo Reservoir		Okl.
Tuktata Reservoir		Okl.
Pine Creek Reservoir		Okl.
Texas		
Cooper Lake and Channels		Tex.
Lake O' the Pines		Tex.
Wright Patman Dam and Lake		Tex.
Red River Levees and Bank Stabilization, Texas, Oklahoma, Arkansas, and Louisiana	Under way	
Incorporated Projects		
Arkansas		
Hamstead County Levee District No. 1		Ark.
Louisiana		
Aloha-Rigolette Area		
Grant and Rapides Parishes	Completed	
Bayou Bodeau and Tributaries	Authorized	
Bayou Bodeau, Red Chateaux, and Long Bayou	Completed	
Bodeau Dam and Reservoir	Completed	
Bayou Pierre	Completed	
Bayou Pierre, Vicinity of Shreveport	Completed	
Collax, Grant Parish	Completed	
Grant Parish Below Collax	Completed	
Natchitoches Parish	Completed	
Pineville	Completed	
Red River, Vicinity of Shreveport	Completed	
Red River Parish	Completed	
Saline Point	Completed	
Wallace Lake	Completed	

* For the States of Arkansas, Oklahoma, and Texas, the benefits accumulated to date for the completed and partially completed features of this project are shown elsewhere in this booklet and in similar booklets.

** Phase I M&D planning.

in Bayou Rigolette, and Saline, Walden, and Dry Bayous; and the separation of the Bayou Darrow and Bayou Rigolette drainage areas by closure of the head of Bayou Darrow and adjacent sloughs.

After completion of the levee system below Bayou Darrow, the most severe flood experienced was that of May 1953. Although heavy rainfall flooded a large part of the area, about 5,600 acres were protected from Red River overflow. About 41,600 acres and 36,300 acres were protected from Red River overflow during the floods of April-June 1957 and May 1958, respectively.

The entire project was completed in 1956 at a total Federal cost of \$1,653,237. Benefits from this project are inseparable from those of the companion project, "Grant Parish Below Collax," since each provides partial protection for the same area. Cumulative benefits from the prevention of floods for the two projects (through September 1983) are estimated at \$2,591,000. The project is maintained by the 19th Louisiana Levee District in Grant Parish, and the Red River, Atchafalaya, and Bayou Boeuf Levee District in Rapides Parish.

Bayou Bodeau and Tributaries (Vicksburg District). Bayou Bodeau drains 1,158 square miles in southwestern Arkansas and northwestern Louisiana. It rises in the vicinity of Hope, Arkansas, and flows southerly through Bodeau Dam and joins Cypress Bayou to form Red Chute Bayou. The flow continues through Red Chute Bayou, Flat River, and Loggy Bayou and enters Red River from the left bank about 50 miles below Shreveport. The protection authorized by the Flood Control Act of October 1965 consists of levees and channel improvement which would afford protection against a headwater flood with a recurrence interval of 25 years and a backwater flood of the same magnitude as the 1945 flood on Red River under 1962 reservoir conditions. The project will benefit an estimated 20,710 acres of fertile Red River agricultural lands.

This project was one of the water resources projects reviewed in March 1977 under the President's Review Criteria. As a result of the review, the project was found not to have sufficient benefits to offset the adverse environmental impacts. Deletion of funding from the FY 78 budget, as well as deauthorization of the project, was recommended.

The Senate Report (97-256) pursuant to the FY 82 Appropriation Act stated that the partially constructed project was reconfirmed for prosecution without further studies and analysis. In light of development in the project area, which had occurred during the inactive construction period (1977 to 1982), it was deemed advisable to reanalyze the project scope. General reevaluation studies were initiated in 1983 and were completed in 1987. The reevaluation study found that none of the alternatives investigated to alleviate the flooding problems were economically justified. For this reason, the project was reclassified to the inactive category of Civil Works projects.

Bayou Bodeau Dam and Reservoir, Arkansas and Louisiana (Vicksburg District). Bayou Bodeau Reservoir is located in Webster and Bossier Parishes, Louisiana, and Lafayette County, Arkansas. This heavily forested single-purpose flood control reservoir

retains no permanent pool. The dam is an 11,900-foot-long rolled-earth fill with two uncontrolled conduits 10 feet in diameter and a 4,000-foot uncontrolled spillway.

The top of the flood pool is at elevation 199.5 feet NGVD. For flood control storage, the reservoir has a capacity of 357,300 acre-feet, which will cover 21,000 acres. Seventy-two thousand acres of fertile bottomland, including parts of Barksdale Air Force Base and Bossier City, are protected by the reservoir.

During the flood of May 1958, stages at the U.S. Highway 80 gage were reduced by an estimated 2.9 feet and flooding was prevented on 9,900 acres of cropland. Estimated cumulative flood damages of \$578,000 have been prevented by this project through September 1981.

Recreational development has spurred visitation to the reservoir from an estimated 8,000 people in 1955, to approximately 328,000 in 1979. Facilities including picnicking, camping, boat launching, rest rooms, and potable water supply systems were developed by the U.S. Army Corps of Engineers at a cost of about \$132,000 through June 1974.

Waterfowl and upland game hunting areas have been enhanced by the Louisiana Department of Wildlife and Fisheries, through license agreement with the Secretary of the Army. Public hunting and fishing on about 32,000 acres in the area have been improved through an intensive habitat management program in cooperation with the Corps of Engineers.

A 500-acre subimpoundment, Ivan Lake, has been constructed on an arm of Bodeau Lake, just north of State Highway 160, by the Bossier Parish Police Jury under license agreement and in cooperation with the State of Louisiana, Department of Transportation and Development, Office of Public Works. The feature included recreational development of 1,110 acres surrounding the lake.

Construction of the dam was initiated in 1947 and completed in 1961 with the exception of recreational facilities. The total project cost to date is \$4,232,000, including \$132,000 for recreational facilities.

Bayou Bodeau, Red Chute, and Loggy Bayou (Vicksburg District). Located downstream of Bodeau Dam, about 25 miles southeast of Shreveport, this project consists of channel improvement for flood control.

Improvement of the lower 7.8 miles of the channel consisted of 2.4 miles of snagging and clearing and 5.4 miles of channel enlargement. The project was completed in 1948 at a Federal cost of \$319,200. A modification of this project, "Bayou Bodeau and Tributaries," is described previously.

During the flood of May 1958, stages at the U.S. Highway 80 gage, just northeast of Shreveport, were estimated to have been reduced by 2.6 feet, and the flooding of 9,100 acres of cropland was prevented because of this project. Estimated benefits cumulative through September 1983 are \$412,000. The Bossier Levee District maintains the project.

Bayou Pierre (Vicksburg District). This 30-mile channel improvement project for flood control extends from Bayou Winney to the mouth of Bayou Pierre. It was completed in 1939 at a cost of \$299,529. Cumulative benefits through September 1982 are estimated at \$921,000. The improvement is operated and maintained by the Corps of Engineers.

Bayou Pierre, Vicinity of Shreveport (Vicksburg District). Drainage for parts of south Shreveport and the agricultural lands below the city is provided by this project. The channel enlargement and snagging and clearing involved 21 miles of channel in and below Shreveport to the mouth of Cypress Bayou. Completed in 1950, the cost was \$332,383, of which \$89,047 was contributed by local interests.

Stages for the flood of April 1953, the largest since completion of the improvements, were reduced an estimated 2.5 feet. About 290 acres within Shreveport and about 4,800 acres downstream of the city were protected from overflow. Project benefits cumulative through September 1982 are an estimated \$2,235,000.

Within the city limits, the channel improvement is maintained by the city of Shreveport, while the remainder of the improvements are maintained by the Caddo Parish Police Jury. Portions of the bayou in Caddo Parish have been enlarged by the Police Jury, in cooperation with the State of Louisiana, Department of Transportation and Development, Office of Public Works.

Campiti-Clarence Levee (Vicksburg District). Flood protection for 29,500 acres of land and improvements on the left descending bank of Red River below Campiti is provided by this levee. Works consist of 30 miles of ring levee to protect the area from Red River and Saline Bayou overflow, and construction of interior drainage improvements to alleviate the local interior flood problem. Construction of the project was initiated in 1964 and completed in 1968. Total cost of the project was \$2,053,000, which includes \$480,000 non-Federal costs.

East Point Levee (Vicksburg District). This project consists of approximately 13 miles of levee along the left bank of Loggy Bayou and Red River with appurtenant drainage works, including a control structure at Coushatta Bayou. About 9,000 acres of Red River bottomlands near Coushatta are protected. Construction was initiated in 1966 and completed in 1968. Total cost was \$553,100, including \$67,000 local cost.

Grant Parish Below Colfax (Vicksburg District). The Grant Parish below Colfax project was designed to provide increased flood protection to the town of Colfax and vicinity. The improvement consists of an extension of the levee system along the left bank of Red River from Colfax to the west bank of Bayou Darrow, a distance of about 16 miles.

Without the levee, completed in 1941 at a cost of \$38,809, Colfax would have been flooded to an estimated depth of 5 feet in April 1945.

The levee extension has since been enlarged and

extended by a companion project, "Aloha-Rigolette Area, Grant and Rapides Parishes," which was completed in 1956.

Since both projects provide partial protection to the same area, benefits from the two projects are inseparable. Cumulative benefits from the prevention of floods for the two projects through September 1984 are \$2,591,000.

Natchitoches Parish (Vicksburg District). Approximately 135,000 acres in the Cane River "Island" area are protected from Red River overflow by this project. Work was completed in 1956 at a cost of \$1,780,000, of which \$250,900 was contributed by local interests.

The project consists of: 34.4 miles of levee along the right bank of Red River, extending from the vicinity of Natchitoches to Cane River and then along and across Cane River to the hills on the south bank; a diversion channel, about 4.3 miles long, extending from Cane River through the hills to Red Bayou; the widening of 1.2 miles of Red Bayou channel to Red River; and rearrangement of the interior drainage.

An estimated 57,000 acres were protected during the flood of May 1942. The levee system saved portions of the town of Natchitoches from flooding in April 1945 even though practically all of the Cane River "Island" area was inundated.

Flooding occurred over approximately 72,000 acres in the Cane River, Kisatchie Bayou, and Old River area during May 1953. However, the levee protected an additional 40,000 acres from Red River overflow. Sixty-six thousand acres were protected from flooding during both April-June 1957 and May 1958.

Cumulative benefits (through September 1982) from this project are estimated at \$4,226,000. Maintenance of the project is the responsibility of the Cane River Levee District.

Pineville (Vicksburg District). The Pineville project is designed to protect the city of Pineville and vicinity against floodwaters of the Red River. Improvements authorized in 1941 consist of about 1.14 miles of levee, the raising and widening of 1,240 feet of railroad embankment, four drainage structures, and a pumping station. The major portions of this work were completed in 1951 at a cost of \$232,426.

During the flood of May 1953, approximately 130 acres in the area were protected by the levee system.

Cumulative flood damages prevented by the project through September 1982 are estimated at \$37,000. Maintenance of the project, including operation of the four drainage structures and the pumping station, is the responsibility of the Red River, Atchafalaya, and Bayou Boeuf Levee District.

Posten Bayou, Arkansas and Louisiana (Vicksburg District). A project for the Posten Bayou, Arkansas and Louisiana area, was authorized by PL 218, 84th Congress, and approved August 1955. It provided for realignment and enlargement of Posten Bayou below

Mile 10 for diversion of tributary flood runoff from an area of about 9,200 acres. Due to opposition from the State of Louisiana, the project was placed in an inactive status.

In a restudy of the problem under the Comprehensive Basin Study of Red River below Denison Dam, an alternative plan for a project lying wholly within the State of Arkansas was developed. An interim report recommending this plan in lieu of the previous plan was completed in 1968, and the recommended improvements were authorized in 1970 under Section 201 of the Flood Control Act of 1965. In 1977 the project was classified inactive due to the inability of the local sponsor to provide local cooperation requirements. For details, see Arkansas booklet.

Red River, Vicinity of Shreveport (Vicksburg District). Consisting of bank protection works, this project extends intermittently from the lower limits of Bossier City, Mile 304.6, upstream to Mile 315.0. This effort to stabilize the Red River channel and prevent excessive bank caving includes works at Brownlee Bend, Honore Bend, Bossier City front on the left bank, Twelvemile Bayou Bend, Douglas Island Bend, and Shreveport front on the right bank.

Features of the project protect about 58,000 linear feet of Red River banks and include 31,000 feet of board revetment, 6,800 feet of pile dike, 5,300 feet of rock groins, 19,780 feet of fascine boxes, 9,930 feet of pile revetment, and 470 feet of baffle dikes.

Costs for the project, completed in 1953, were \$3,908,000. Through September 1982, the project has prevented an estimated total of \$2,015,000 in cumulative flood damages. The project is maintained by the Caddo and Bossier Levee Districts, each of which maintains the work within its own District.

Red River Levees and Bank Stabilization Below Denison Dam, Texas, Oklahoma, Arkansas, and Louisiana (Vicksburg and Tulsa Districts). Works under this project will protect against a flood equivalent to that of 1945 if it had been confined by levees. The project consists of raising and strengthening the existing and authorized levees of Red River from the vicinity of Index, Arkansas, to Pineville, Louisiana, on the left descending bank and to Boyce, Louisiana, on the right descending bank. There are approximately 153 miles of levees on the left bank and 240 miles of levees on the right bank in the system. Approximately 30 miles of additional levee along the left bank has been subsequently incorporated into this project. Bank protection and channel stabilization works are constructed in areas where levee relocations are infeasible or uneconomical.

In Louisiana, approximately 76 miles of levee on the right bank and 27 miles on the left bank have been raised to grade and section. A total of 38 miles of bank have been protected and four cutoffs have been constructed in Louisiana. Authorized in 1946, this project will cost an estimated \$59,650,000 in Federal funds, of which \$59,607,000 have been allocated through September 1986. The project is scheduled for

completion in 1987. The completed portions of the project are maintained by local interests.

Red River Parish (Vicksburg District). About 176,000 acres of land in the Bayou Pierre Basin along Red River are protected by this project. Completed in 1940, at a cost of \$149,435, the improvements include 31.0 miles of new levees and levee enlargement along the south bank of Red River in Red River Parish.

Although the levee was breached during the flood of 1945, 20,000 acres were still protected from floodwaters. The levees protected about 29,000 acres of land during the flood of April-June 1957 and about 31,000 acres during the flood of May 1958.

Cumulative benefits for this project through September 1982 are estimated at \$1,706,000. The project is maintained by the Red River Levee and Drainage District.

Saline Point (Vicksburg District). Designed to reduce flood stages by increasing the efficiency of the channel, this project consists of two cutoffs on Red River. Completed in 1942, at a cost of \$124,100, the Saline and Double Eddy Cutoffs connect Mile 65.5 to 54.0 (1938 mileage). Necessary levee setbacks were also included in the project.

The improvements have significantly reduced flood stages in the area, and benefits, cumulative through September 1982, are estimated at \$65,000.

Wallace Lake (Vicksburg District). Wallace Lake, located on Cypress Bayou below Shreveport, provides protection from floodwaters to about 90,000 acres of agricultural lands in Caddo and DeSoto Parishes. The original project was authorized by the Flood Control Act of June 1936, as amended by the Act of June 1938.

Construction was initiated in 1941 and completed in 1946 at a total project cost of \$1,219,371, including \$17,164 for recreational facilities.

The dam, which is located 14 miles southeast of Shreveport, rises to a maximum of 48 feet above the valley floor. It is comprised of an earth fill 4,300 feet long, a reinforced-concrete overflow spillway 644 feet in length with crest at elevation 158 feet NGVD, and outlet works. The outlet works, consisting of four rectangular conduits, each 8.25 feet wide and 3 feet high, with an invert at 140 feet NGVD, are integral with the spillway. The lake controls the runoff from 260 square miles of the Cypress Bayou watershed.

The total storage capacity of the lake is 96,100 acre-feet, of which 7,800 acre-feet are for conservation and 88,300 acre feet are for flood control. The surface area of the lake is 2,300 acres at conservation pool, elevation 142 feet NGVD, and 9,300 acres at flood pool, elevation 158 feet NGVD.

The project has prevented an estimated \$1,118,000 in flood damages, cumulative through September 1981.

Wallace Lake is one of the secluded recreation spots of the Shreveport area. The conservation pool of the lake and its cypress swamp environment provide

opportunities for fishing and hunting. Improved access roads to the lake have been constructed. Boats, tackle, bait, and other necessities may be obtained at fishing camps located on the lake. In 1979, an estimated 104,000 persons visited the project for recreational purposes. The project is operated and maintained by the Corps of Engineers.

West Agurs Levee (Vicksburg District). The West Agurs levee, constructed by local interests in 1961, poses a serious flood threat to the area behind the levee due to possible failure from uplift and underseepage during a large flood. The 700 acres of land located behind the levee is a rapidly expanding area of Shreveport. The project, authorized by the Water Resources Development Act of 1976, provides for improvements to reduce this flood threat and incorporation of the West Agurs levee into the Federal project Red River Below Denison Dam. The authorized improvements would have consisted of the installation of 232 relief wells along the bottom of the existing drainage canal which runs adjacent to West Agurs Levee.

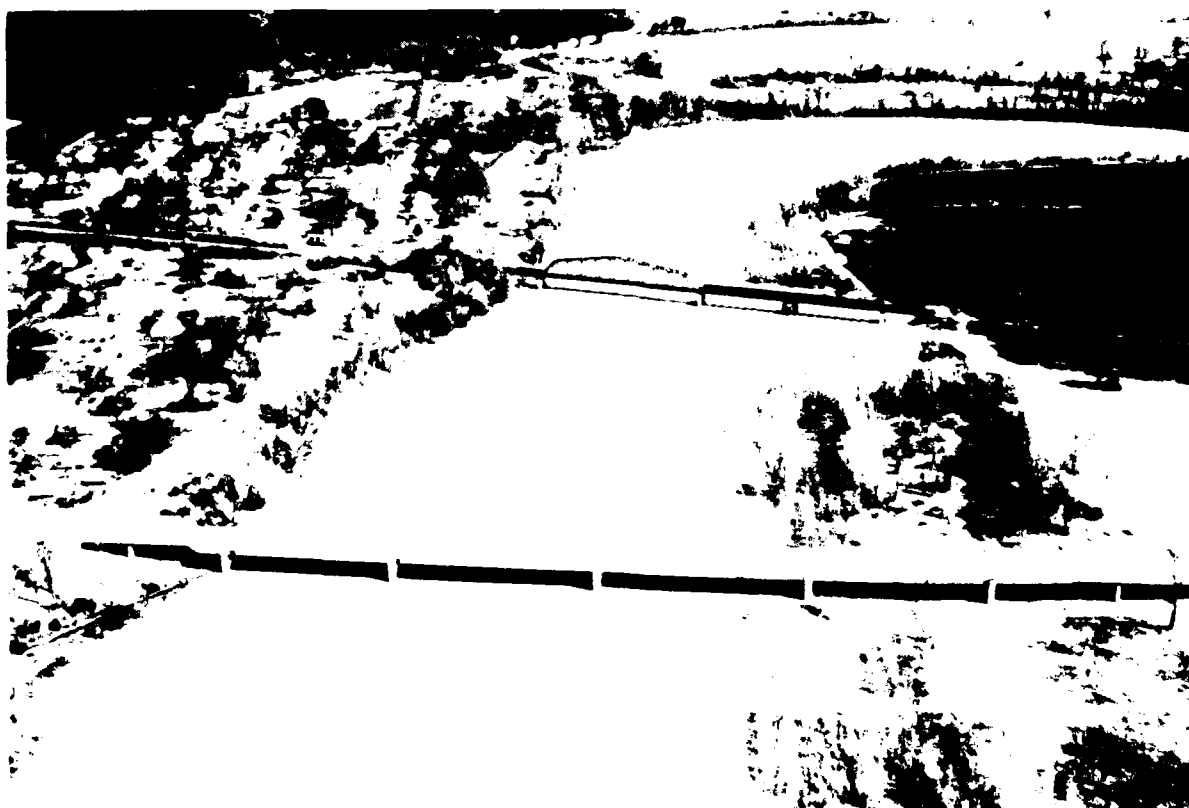
Preconstruction planning studies showed that wells located in the bottom of the borrow pit could be subject to sedimentation and possible clogging. Because of the clogging possibility, a new plan was selected. The newly selected plan of improvement would provide for temporary ponding in the borrow pit to counteract uplift pressure during flood conditions on Twelvemile Bayou.

The Caddo Levee District completed the levee improvements required to accommodate the temporary ponding plan in October 1983. The West Agurs Levee was incorporated into the Federal system in December 1983.

Red River Below Fulton, Ark. (Vicksburg District)

Previous work for the improvement of Red River below Fulton, Arkansas, was first authorized in 1828 and subsequent years through 1890. The existing project was authorized by the River and Harbor Act of 13 July 1892. A 35-mile link between the Ouachita and Black River navigation project and the Mississippi River is included in the project. Features of the project are clearing of banks, snagging, dredging shoals, building levees, closing outlets, revetting caving banks, and preventing injurious cutoffs. No channel dimensions are specified. Although this is a continuing project, it is considered complete.

Except during high river stages, which usually are of short duration, depth for navigation on Red River is insufficient above the mouth of Black River. Traffic in the upper river is generally limited to movement of construction equipment and supplies. Average annual traffic from 1977-1981 was 1,624,863 tons, practically all of which was through traffic from the Black and Atchafalaya Rivers to Mississippi River.



Bridges at Fulton, Louisiana

Work under this authorization, exclusive of operation and maintenance, cost \$1,963,806. Two later modifications of this project, Overton-Red River Waterway and Red River Waterway, are discussed separately on page ?? and in the following paragraphs.

Red River Waterway Louisiana, Arkansas, Oklahoma, and Texas (Vicksburg and Tulsa Districts)

The River and Harbor Act of 1968 authorized, among others, the following improvements:

- As a modification of the project, "Red River Below Fulton, Arkansas, and Louisiana," a plan for navigation on Red River from the Mississippi River to Shreveport consisting of a channel 9 feet deep and 200 feet wide, utilizing five navigation locks and dams.
- As a modification of the project, "Cypress Bayou and Waterway Between Jefferson, Texas, and Shreveport, Louisiana," a plan for navigation on Twelvemile and Cypress Bayous, from Shreveport, Louisiana, to Dangerfield, Texas, consisting of a channel 9 feet deep and 200 feet wide, utilizing three (two existing) navigation dams and three navigation locks.
- As a modification of the project, "Red River Levees and Bank Stabilization Below Denison Dam, Texas, Arkansas, and Louisiana," a comprehensive plan for bank stabilization on Red River from Denison Dam to the Mississippi River.

Recreation facilities are included as integral parts of each of the above modifications.

The estimated total cost for the project (1986) is \$2,833,473,000. This total includes work in the Index, Arkansas, to Denison Dam, Texas, reach of the project which will be performed by the Tulsa District, with a total of \$217,000,000 Federal costs and \$92,000,000 non-Federal costs. The Mississippi River to Shreveport reach is the only segment of the project presently under construction. The estimated costs of this reach are \$1,504,294,000 Federal and \$88,219,000 non-Federal.

The Mississippi River to Shreveport reach, located entirely within Louisiana, includes approximately 236 miles of navigation improvements, 225 miles of channel stabilization works, and various recreational facilities. Construction of this reach was initiated in 1973 and has included work on numerous channel realignment and stabilization items. Work was initiated on Lock and Dam No. 1 in 1977, and this structure was formally dedicated in November 1984.

Construction of the John H. Overton Lock and Dam No. 2 was initiated in 1983 and is scheduled for completion in 1987. Upon completion of the Overton Lock and Dam, navigation will be provided as far upstream as Alexandria, Louisiana. Authorization for the purchase of wildlife mitigation lands was included in the Water Resources Development Act of 1986 (P.L. 99-662). The law allows the acquisition, development, and management of 14,000 acres to offset wildlife habitat losses above river mile 104. An economic

reanalysis of the Shreveport to Dangerfield, Texas, reach was initiated in 1974, and studies to date have been inconclusive. Studies on this segment of the project are inactive at this time. Preconstruction planning was initiated on the Shreveport, Louisiana, to Index, Arkansas, reach in 1976 and is continuing.

Shreves Island Cutoff (Vicksburg District)

This is an emergency channel improvement project in Bossier Parish near Blenheim, which was completed in 1936 at a cost of \$85,746.

Twelvemile Bayou (Vicksburg District)

Enlargement of Twelvemile Bayou between Cash Point Floodgates, Mile 9.6, and U.S. Highway 71 bridge, Mile 4.5, and snagging and clearing between U.S. Highway 71 bridge and Red River, were authorized under Section 205, Flood Control Act of 1948, as amended.

Work on this project was initiated in 1964 and completed in 1965 at a cost of \$335,433. Cumulative benefits from flood damages prevented through September 1982 are estimated at \$77,000.

Small Projects

Snagging and clearing were completed on the following streams in the Red River Basin under the authority of Section 208 of the 1954 Flood Control Act, which amended Section 2 of the 1937 Flood Control Act.

<i>Stream</i>	<i>Length (miles)</i>	<i>Date</i>	<i>Cost</i>
Wallace Bayou	3.2	1951	\$11,502
Posten Bayou*	10.0	1951	46,021
Brush Bayou**	4.7	1953	48,317
Cane River	18.6	1960	97,035
Brush Bayou*	4.7	1960	49,785

*Improved by enlargement.

**Improved by realignment.

Emergency Projects

Emergency Bank Protection (Vicksburg and Tulsa Districts). Under currently funded projects upstream of the Overton-Red River Waterway (lower 31 miles) project, authorized bank stabilization works are limited to isolated locations for immediate protection of short segments of levee or other improvements. These isolated efforts do not provide an effective solution to the overall problem of bank caving and channel migration. Accelerated bank loss and channel misalignment in various reaches of the Red River have become critical.

A comprehensive bank stabilization program for these critical reaches is proposed under the Red River Waterway project, as authorized by the River and Harbor Act of 1968. An emergency plan to treat major meanders and correct misalignment in these critical reaches in accordance with the comprehensive program was considered necessary and justifiable and was

approved in the 1970 Senate hearings. Construction of bank protection works was initiated in 1972 and is currently scheduled for completion in 1988. The estimated Federal cost of the project is \$69,800,000 and the total Federal cost is \$7,000,000. Funds in the amount of \$68,123,000 have been allocated through September 1987.

Natural Disaster Assistance (Vicksburg District). Under this law the U.S. Army Corps of Engineers is authorized to cooperate with the Federal Emergency Management Agency (FEMA) in providing assistance to State and local governments in dealing with natural disasters.

On 3 December 1978, a tornado struck Bossier City, killing 3 persons, injuring 164, and inflicting \$1,500,000

in damage. On 6 December 1978, the President of the United States declared this site of the destruction a major disaster area, and Corps of Engineers engineers and levee pilots were dispatched to aid FEMA in the application of assistance in recovering the damage and restoring the disaster area.

Emergency Flood Activities (Vicksburg District). Emergency repairs or restoration of any flood work threatened or destroyed by flood, including strengthening, raising, extending or other modifications deemed necessary for adequate functioning, are authorized under this law. Levee work in Red River Basin accomplished under this authority is shown in the following tabulation:

<i>District Levee</i>	<i>No. Setbacks or Repairs</i>	<i>Quantity (cu yds)</i>	<i>Cost</i>
Red River			
Red River, Atchafalaya and Bayou Boeuf Levee	69	5,035,468	\$2,807,006
Red River, Bayous Darrow and Rigolette Levee	2	333,796	81,600
19th Louisiana Levee Drainage	15	759,873	197,681
Cane River Levee and Drainage	16	1,303,185	519,448
Red River Levee and Drainage	31	1,444,331	1,056,734
Saline Levee and Drainage	1	240,881	88,743
Bossier Levee	13	627,659	234,256
North Bossier Levee	8	746,072	160,008
Caddo Levee	26	1,201,752	363,037
5th Louisiana Levee	1	199,426	83,977
Campiti-Clarence Levee	3	58,300	57,088
Natchitoches Levee and Drainage	1	15,000	10,000
Twelvemile Bayou			
Caddo Levee	1	13,414	5,978
Black Bayou			
Caddo Levee	2	40,466	31,389
Pine Brush Bayou			
19th Louisiana Levee	1	15,316	6,099

Programs and Surveys

Flood Plain Information Reports

Benoit Bayou (Vicksburg District). A special flood hazard information report for the Bossier City area was completed and published in 1973.

The study area encompasses the Benoit Bayou watershed. The report was prepared at the request of the Shreveport Area Office of the Federal Housing Administration in an effort to encourage the most efficient use of land for which residential development is being planned. The report indicates that the area is subject to headwater flooding. Information concerning the possible future flooding is also presented in the report.

Bickham Bayou (Vicksburg District). A special flood hazard information report on the area along Bickham

Bayou near Shreveport was completed and published in 1973.

The study area encompasses the Bickham Bayou watershed. The report was prepared at the request of the Shreveport Metropolitan Planning Commission of Caddo Parish in an effort to encourage the most efficient use of land within its jurisdiction and to eliminate flood damages and hazards through well-planned local regulations governing development and use of flood plains. The report indicates that the area is subject to headwater flooding and provides information on the extent and severity of possible future flooding.

Brush Bayou (Vicksburg District). A special flood hazard information report for the area along Brush Bayou in the vicinity of Shreveport was completed and published in 1968.

The study area encompasses the Brush Bayou watershed. The report was prepared at the request of the Shreveport Area Office of the Federal Housing Administration in an effort to reduce the risk to the public, builder, and Federal Housing Administration, and, in addition, to provide a basis upon which to approve further developments along Brush Bayou from its intersection with U.S. Highway 171 downstream to Wallace Lake flood control pool. The report indicates that the area is subject to headwater flooding. Information concerning the extent and severity of possible flooding is presented in the report.

Sand Beach Bayou (Vicksburg District). A special flood hazard information report on portions of Bayou Pierre and Sand Beach Bayou in the city of Shreveport and vicinity was completed and published in 1974.

The report was prepared at the request of the Shreveport Area Office of the Federal Housing Administration in an effort to encourage the most efficient use of land for which residential development is being planned. The report indicates that the area is subject to headwater flooding and provides information on the extent and severity of possible future flooding.

Shreveport No. 1 (Vicksburg District). A flood plain information report on McCain Creek and Gilmer Bayou in Shreveport and vicinity was completed and published in 1971 at a cost of \$30,864.

The study area covers McCain Creek, beginning at its confluence with Twelvemile Bayou and extending upstream approximately 4.2 miles. The report indicates that this area is subject to a combination of headwater and backwater floods. Backwater flooding has been reduced by Federal flood control projects on the Red River and by Lake O' the Pines (Ferrells Bridge Dam) on Cypress Creek, a tributary to Twelvemile Bayou. The Red River navigation and bank stabilization project, authorized by the U.S. Congress in the River and Harbor Act of 1968, would reduce flooding on McCain Creek by the lowering of flood stages on Red River and Twelvemile Bayou. The study also covers Gilmer Bayou, beginning at its confluence with Boggy Bayou and extending upstream approximately 9 miles. The report revealed that this area is subject to headwater flooding. There are no Federal or State control projects on Gilmer Bayou.

Shreveport No. 2 (Vicksburg District). A flood plain information report on the Brush Bayou area in the vicinity of Shreveport was completed and published in 1974 at a cost of \$22,000.

The study area encompasses Brush Bayou and tributaries beginning along Brush Bayou at Mile 2 and continuing upstream to Mile 9. The study indicates that the area is subject to headwater flooding. A detailed project report has been completed by the Corps of Engineers and approved by the Office of the Chief of Engineers. The report is favorable to improvements which would significantly reduce flooding in the area.

Shreveport No. 3 (Vicksburg District). A flood plain information report on the Logan and Choctaw Bayous

area in the vicinity of Shreveport was completed and published in 1974 at a cost of \$27,800.

The study area encompasses Logan Bayou from Mile 0 to 4.8 and Choctaw Bayou from Mile 0 to 7. The report indicates that the area is subject to headwater flooding and provides information on the extent and severity of possible future flooding.

Flood Insurance Studies

Under the National Flood Insurance Act of 1968 (P.L. 90-448) and the Flood Disaster Protection Act of 1973 (P.L. 93-234), the HUD was authorized to establish and carry out a National Flood Insurance Program. Upon the request of the Federal Insurance Administration of the Federal Emergency Management Agency, the Corps of Engineers conducts flood insurance studies.

In the Red River Basin, insurance studies were completed in the following areas: Alexandria, Colfax, and the unincorporated areas of Rapides Parish. In 1986 an insurance study was initiated in Caddo Parish. It is scheduled for completion in 1987.

Surveys Authorized or Under Way

Aloha-Rigolette (Red River) Area (Vicksburg District). This study was authorized by a resolution adopted by the Committee on Public Works of the United States Senate on 22 May 1974. The purpose of the study is to review the report on the Red River and Tributaries, Texas, Oklahoma, Arkansas, and Louisiana, downstream from Denison Dam, and subsequent reports with regard to determining the advisability of providing additional flood protection in the Aloha-Rigolette area.

The Aloha-Rigolette drainage basin encompasses an area of approximately 418 square miles and lies on the left descending bank of Red River. During periods when Red River is high, the floodgate through the levee at the lower end of the basin must be closed to prevent backwater flooding. Consequently, tributary runoff collects in a natural sump area which cannot be evacuated until Red River stages recede. Flooding also occurs after each heavy rain. Solutions to be considered in the study include, singly or in combination: channel enlargement, clearing and snagging, floodgate modification, pumping stations, new channels, small reservoirs, flood plain management, and other structural and nonstructural measures.

A feasibility report and FIS were referred for review to the Board of Engineers for Rivers and Harbors in May 1986. A notice of the study status was released at that time. Subsequent to that notice, the report and FIS were recalled to accomplish additional plan formulation studies. No completion date has been set.

Red River Basin and South-Central/Southeast Oklahoma Comprehensive Studies (Vicksburg, Tulsa, Fort Worth, and Little Rock Districts). This study effort is being conducted and coordinated by Tulsa District. The study, authorized by Public Law 98-63, 98th Congress, July 29, 1983, Supplemental Appropriations Act, 1983, is a comprehensive water resources

development study which was initiated in 1983. Vicksburg District has provided reconnaissance level input to Tulsa District for that portion of the Red River Basin, which is within Louisiana, as deemed appropriate.

Red River Below Denison Dam; Comprehensive/Authorizing Report (Vicksburg District). In 1976 and 1977 work was initiated on two authorizing reports: the Bayou Dorcheat, Arkansas, and the Cane River Island Area, Louisiana, respectively. Work on an additional authorizing report, Caddo Lake Enlargement, was initiated in 1980.

The Bayou Dorcheat Basin is located primarily in Nevada, Lafayette, and Columbia Counties, Arkansas, and Webster Parish, Louisiana.

The water and related land resource problems and needs in the Bayou Dorcheat Basin identified in the Type II Comprehensive Basin study included flood control, municipal and industrial water supply, water quality control, recreation, and fish and wildlife. A reassessment of the problems and needs in the basin under the current study indicated that further study by the Corps of Engineers would not likely result in recommendations for improvements by the Corps. Flood losses are relatively light and widespread, requiring costly remedies. Positive steps have been taken by local interests to meet a major portion of the future water supply needs; streamflow augmentation benefits for water and environmental quality are questionable. No unmet area recreational needs relative to fishing and hunting are projected. As a result of these findings, the study was terminated in 1979.

The Cane River drainage basin encompasses approximately 746 square miles in Natchitoches, Vernon, and Sabine Parishes, with the greatest portion of the area in Natchitoches Parish. A portion of this drainage basin, known as Cane River Island, has a flooding problem. The interior drainage of Cane River Island is discharged into Cane River through gated gravity drainage structures. During periods of high stages on Cane River, the gates must be closed to prevent backwater flooding; consequently, flooding due to the impoundment of local runoff results. Solutions considered during the course of the study were: channel improvements, pumping stations, floodgate

modifications, and nonstructural measures. The study was completed in 1986 and recommended no Federal action.

Caddo Lake Dam is located in Caddo Parish, about 19 miles northwest of Shreveport, upstream of the confluence of Black and Twelvemile Bayous. The reservoir behind the dam extends upstream into Marion County, Texas. The purpose of the study is to determine the advisability of enlarging the existing lake to provide water supply for municipal and industrial purposes, and to provide additional recreational opportunities. The study was completed in 1986 and recommended no Federal action.

Red River Below Denison Dam, Comprehensive Basin Study, Louisiana, Arkansas, Oklahoma, and Texas (Vicksburg District). A study was initiated in 1962 under the direction of a coordinating committee chaired by the New Orleans District. The basic objective of the study was to develop a comprehensive plan for development of the water and related land resources of the basin. Two interim reports were completed prior to completion of the comprehensive study. The first, entitled "Interim Report on Navigation and Bank Stabilization," was submitted for review in 1966. The second, entitled "Poston Bayou, Arkansas," was submitted in 1968. The report presenting the overall comprehensive plan was completed and submitted to the Water Resources Council in July 1968.

Plans developed in the comprehensive report were divided into early action and long-range segments. Each segment of the plan includes a broad spectrum of structural and nonstructural measures. Features of the early action segment are needed now and should be implemented within the next 10 to 15 years. Reports seeking authorization of noncontroversial early action projects have been prepared by New Orleans District and Districts.

Red River Waterway, Mississippi River to Shreveport, Louisiana, Hydropower Feasibility Study

(District). Authorized by the Federal Energy Development Administration, the study is to investigate the feasibility of installing hydropower dams to generate electric power.

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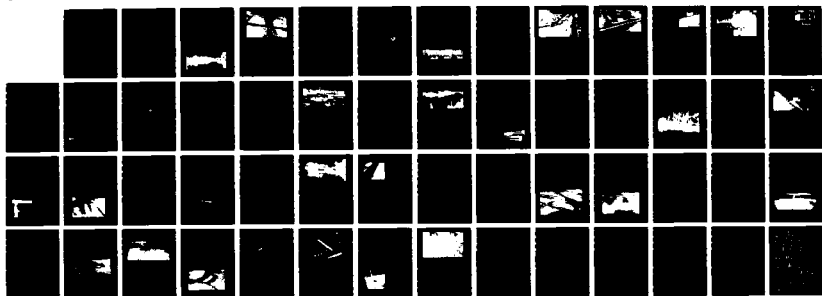
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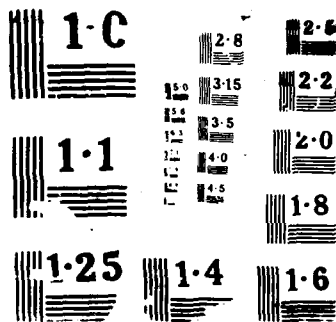
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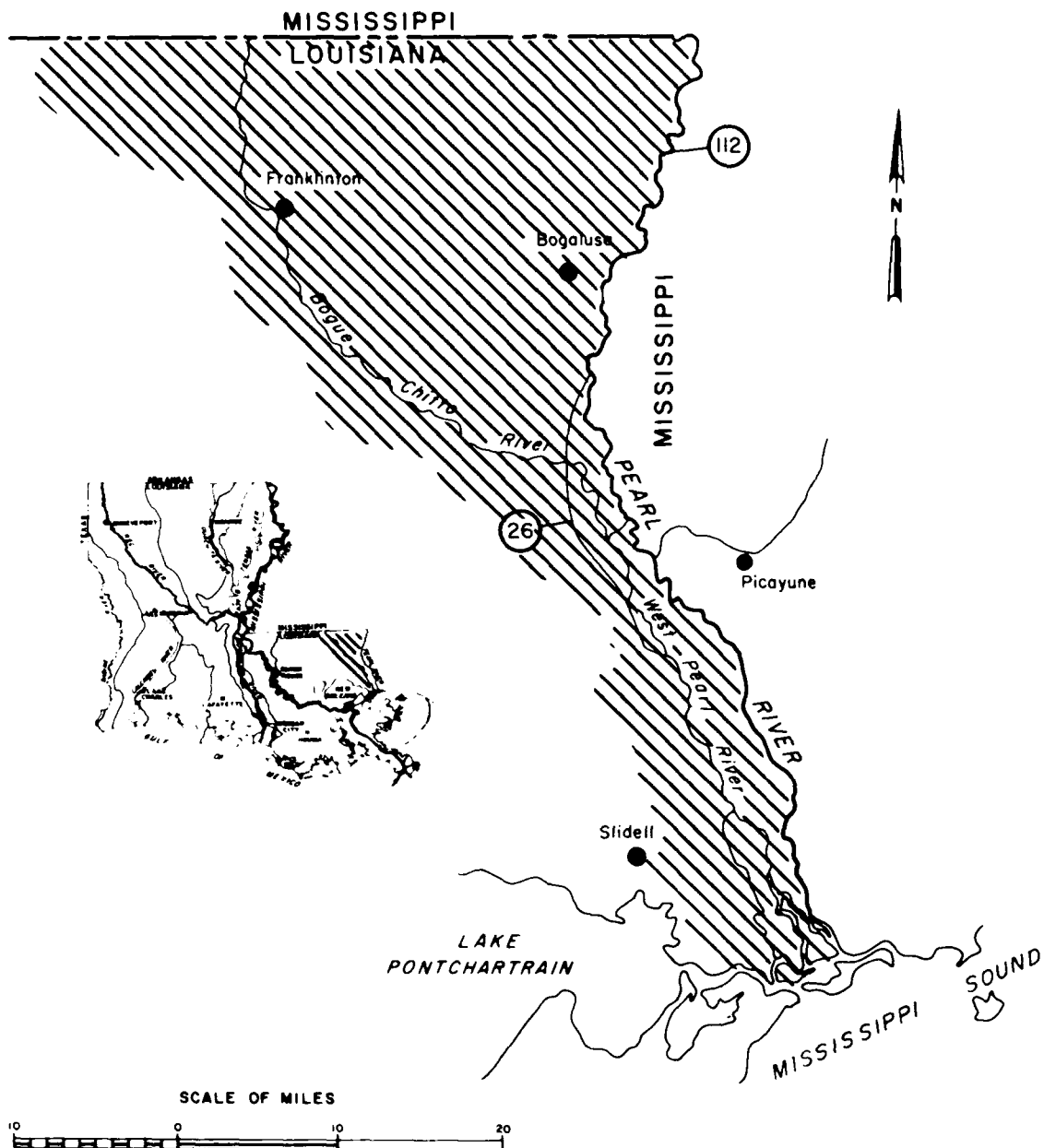
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PROJECTS



NAVIGATION PROJECTS

- 26 Pearl River Waterway, Mississippi and Louisiana
- 112 Pearl River

Pearl River Basin

Pearl River Basin

Introduction

The basin, located in the eastern part of Louisiana, is bounded by the State of Mississippi on the north and east and by the Lake Pontchartrain Basin on the south and west. Improvements in the basin have been authorized for the purposes of navigation and associated

uses. In recent years, commercial traffic in the basin has decreased, and improvements are mainly used for recreational purposes. The two navigation projects located in the basin are described subsequently.

Projects

Pearl River

(Vicksburg District)

Under one of the Corps' special authorizations, Section 3 of P.L. 14, 79th Congress, a 150-foot-wide channel was snagged and cleared in the 65-mile reach between Bogalusa, Louisiana, and Columbia, Mississippi, for small boat navigation. Work on the project was carried out in 1968, 1969, and 1970 at a cost of \$279,000, including \$64,000 contributed by local interests. For information on the waterway below Bogalusa, a project specifically authorized by Congress, see the following project description.

Pearl River Waterway, Mississippi and Louisiana

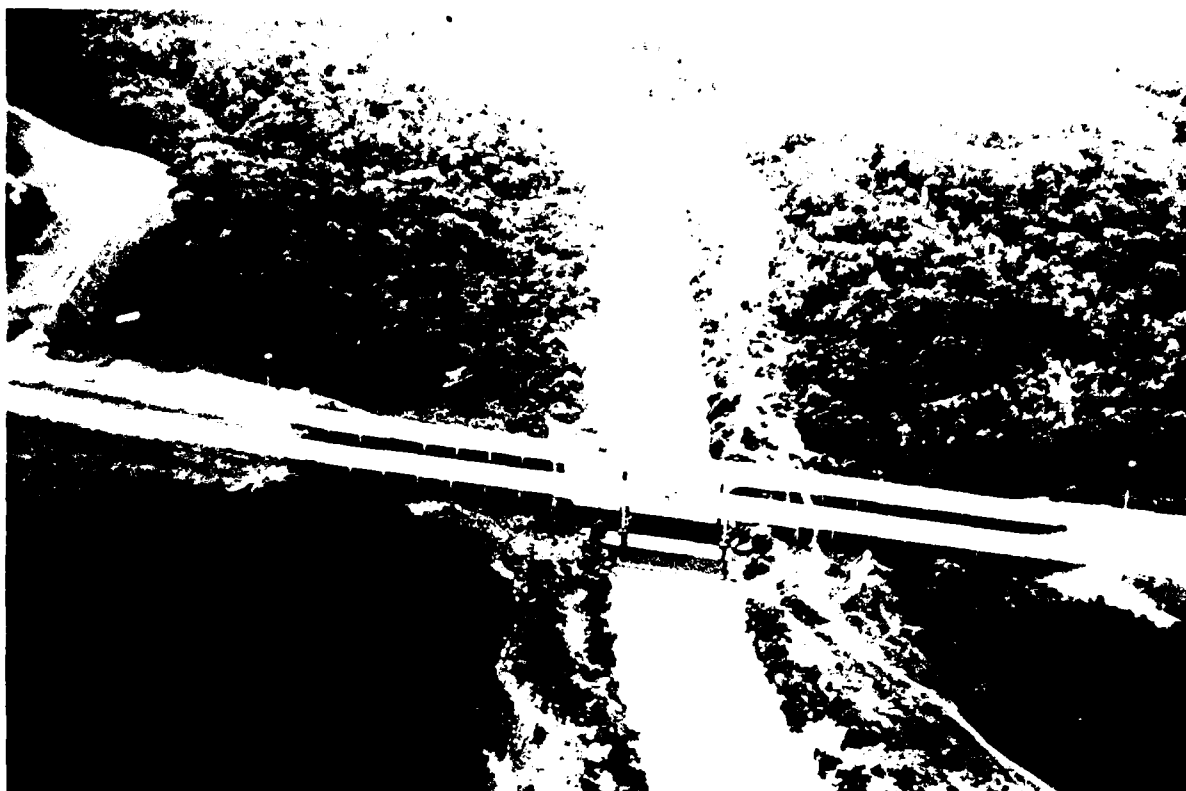
(Vicksburg District)

The West Pearl River Waterway Project was authorized by Congress by the passage of the River and Harbor Act of 1935. Construction was completed in 1956. The project provided a navigation channel from the mouth of the West Pearl River to the vicinity of Bogalusa, Louisiana, a distance of about 58 miles.

Project features consist of a 7-foot deep channel with a bottom width of 100 feet in the river sections and an 80-foot width in the canal section, three navigation locks with inside dimensions of 65 by 310 feet, and two sills to



Lower Pearl River



Interstate 59 crossing Pearl River near Slidell

control water levels in the canal section. In 1966, the River and Harbor Act authorized modifications of the waterway project with provisions for alleviating navigation difficulties encountered in river bends at eight locations on the river below Lock 1.

In the 1960s, commercial navigation on the waterway declined to the extent that maintenance of the channel and canal sections to authorized dimensions was no longer justified. The last maintenance dredging to accommodate commercial traffic was performed in 1973. Also, the project modification authorized in 1966 was not constructed, and the project was placed in an inactive status due to a lack of economic feasibility. However, the three navigation locks are being

maintained and are used occasionally by recreational craft. The upper reaches of the waterway have been used in recent years primarily for water-related recreation activities. The lower segment of the waterway, primarily below Slidell, Louisiana, is still being used for waterborne commerce during high water stages.

Currently, there is renewed interest expressed by various interests and industry along the waterway system to resume operation and perform needed maintenance dredging of the channel and canal sections of the river to authorized dimensions and depth to allow for the movement of waterborne commerce.

Programs and Surveys

Flood Plain Information Reports

Bogalusa (Vicksburg District). A flood plain information report for the Bogalusa area was completed and published in 1973 at a cost of \$24,000.

The study area encompasses the Bogue Lusa and Coburn Creeks watersheds and the Pearl River at Bogalusa. The area is subject to headwater flooding from the Bogue Lusa and Coburn Creeks and backwater flooding from the Pearl River. The report includes a history of flooding in Bogalusa and identifies those areas that are subject to possible future floods. Solutions to flood problems are not provided in the report, however.

Surveys Authorized or Under Way

Pearl River Basin, Mississippi and Louisiana (Vicksburg District). Studies in the Pearl River Basin by the Corps of Engineers are being conducted in response to eight Congressional study resolutions (dated 1963 through 1979) concerning flood control and navigation. A Pearl River Basin study was initiated by the Mobile District in Fiscal Year 1980. A reconnaissance report for the entire basin was completed by the Mobile District in November 1981. Public workshops were held at various locations throughout the basin in December 1981 to discuss the results of this reconnaissance report.

Damages in the basin resulting from the March and April 1979 floods totaled \$261,000,000. Jackson, Mississippi, and vicinity were the primary urban areas affected with damages of \$229,000,000. Several floods occurred in the Pearl River Basin in the spring of 1983, with severe damages incurred in Jackson, Monticello, Tylertown, Foxworth, Carthage, and Columbia, Mississippi, and Slidell and Franklinton, Louisiana. Approximately \$25,000,000 and \$5,500,000 of urban damages were incurred by Jackson and Slidell, respectively, during the 1983 flood. The interim flood control study is basinwide in scope and will focus on flooding problems in the Jackson area, as well as Slidell and Bogalusa, Louisiana; Pearlinton, Carthage, Columbia, Picayune, and Monticello, Mississippi; and Bogue Chitto subbasin. Primary needs being investigated include urban and rural flood damage prevention. The flood control interim is scheduled for completion in late 1988.

Preliminary investigations of extending navigation up the East Pearl River to the vicinity of Picayune, Mississippi, are also underway. Local interests desire that the existing navigation project be extended approximately 11 miles upstream from the current upper limit near the NASA Test Facility. These preliminary studies will be completed in 1987.

Slidell, Louisiana, and Pearlinton, Mississippi (Vicksburg District). The Slidell, Louisiana, and Pearlinton, Mississippi, flood control study evaluated the feasibility of various alternatives that would provide relief for the area. Major flooding from the Pearl River

was experienced in the Slidell area in 1979, 1980, and 1983. During these floods, minor flooding was also experienced in the Pearlinton area. A draft feasibility report was submitted for approval in March 1985. This report recommends a 15 mile levee system for the Slidell, Louisiana area. No feasible plan was developed for the Pearlinton, Mississippi area. The Slidell levee system with its appurtenance structures will protect the area from flooding associated with a 200-year event on the Pearl River and provide the same level of protection against hurricane surges.

The project sponsor, St. Tammany Levee District, and the Assistant Secretary of the Army (Civil Works), in an agreement consistent with the Fiscal Year 1985 Supplemental Appropriation Act (PL 99-88) and Senate Report 1567, signed the Local Cooperation Agreement 30 June 1986. The Board of Engineers for Rivers and Harbors approved the project report April 1986. The report was submitted by the Chief of Engineers to the Secretary of Army on April 8, 1987.

Flood Insurance Studies

Under the National Flood Insurance Act of 1968 (PL 90-448) and the Flood Disaster Protection Act of 1973 (PL 93-234), the HUD was authorized to establish and carry out a National Flood Insurance Program. The Federal Emergency Management Agency now has that responsibility. Upon request of FEMA, the Corps of Engineers conducts flood insurance studies.

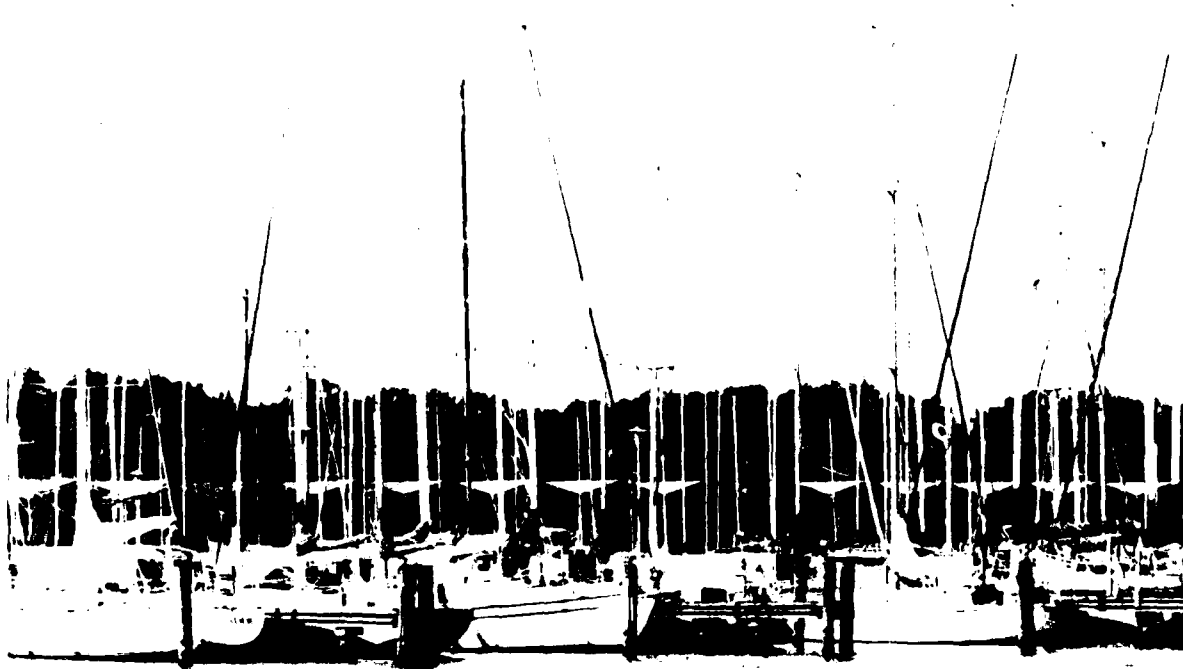
In the Pearl River Basin, a flood insurance study is underway for the town of Pearl River, Louisiana.

Lake Pontchartrain Basin

Introduction

The Lake Pontchartrain Basin comprises the area east of the Mississippi River that is bounded on the north by the State of Mississippi, on the east by the Pearl River Basin, and on the south and west by the east bank of the Mississippi River. The area is characterized by rolling hills and alluvial lowlands with a fringe of

tidal marsh at the shorelines of Lakes Maurepas and Pontchartrain. Improvements have been authorized or constructed for purposes of navigation, flood control, and hurricane protection. Individual projects are described on the following pages.



Marina at West End in New Orleans

Projects

Amite River and Bayou Manchac

(New Orleans District)

This project was completed in 1928 at a cost of \$28,234.

It consists of a 7- by 60-foot channel from Lake Maurepas to Port Vincent and the removal of channel obstructions between Port Vincent and the Kansas City Southern Railroad bridge, which crosses Bayou Manchac at about Mile 8.5.

Although very little commercial traffic has been reported on this waterway in recent years, it is extensively used for recreational purposes.

Amite River and Tributaries

(New Orleans District)

Year-round opportunities for water-based sports are available along this waterway. Hundreds of private camps are located in the area, and 14 commercial access points provide launching, boats, bait, cabins, and restaurant facilities. State-owned public access facilities are located at U.S. Highway 71 on Reserve Canal, Garyville Canal, Blind River, and Bayou Francois. Other public launching areas are available at Port Vincent and Chinquapin.

Designed for flood control along the Amite River, the completed project consists of: a 10.6-mile diversion channel from the Amite River at Mile 25.3 to 4.8 of Blind River; enlargement of the Comite River from its mouth to Cypress Bayou; clearing and snagging of Amite River from its conjunction with the Comite at Mile 54 to 35.7 at Bayou Manchac; enlargement and realignment of Amite River from Bayou Manchac to Mile 25.3; and clearing and snagging of Bayou Manchac from the Amite to Ward's Creek.

The diversion channel is connected to the Amite River by a control weir that serves to retain low flows in Amite River. A small navigation channel through the control allows small boats to pass to and from the river and diversion channel.

The State of Louisiana, Department of Transportation and Development, Office of Public Works, constructed approximately 2.7 miles of the diversion channel and the Comite River enlargement as a substitute for the cash contribution required by the project authorization. The Comite River enlargement is dimensionally greater than planned under the Federal project.

Maintenance of completed works within their respective boundaries is the responsibility of the Ascension and Livingston Parish Police Juries and the East Baton Rouge Parish Council.

Construction of this project was initiated in June 1957 and completed in February 1964 at a cost of \$3,034,685. Cumulative benefits from flood damages prevented through September 1986 are estimated at \$9,441,000.

Bayou Bonfouca

(New Orleans District)

Major traffic on Bayou Bonfouca is generated by a shipyard and a clamshell storage area. In 1977, marine shells accounted for 61,759 tons of traffic on this waterway. Average annual traffic from 1979-1984 was 88,602 tons.

Completed in 1931 at a cost of \$36,497, this project consists of an 8-mile-long channel, which is 10 feet deep, with a bottom width of 60 feet. The waterway extends from Slidell to deep water in Lake Pontchartrain.

The lower end of this project provides access to Lake Pontchartrain from popular boating areas on Bayou Liberty.

Bayou Lacombe

(New Orleans District)

While heavily used for boating, fishing, and access to Lake Pontchartrain, the major cargo on this waterway is gravel from the upper reaches of the bayou.

Both public and commercial launching ramps have been constructed by non-Federal interests.

Traffic on the waterway averaged 447 tons annually from 1979-1983.

Completed in 1938 at a cost of \$4,716, the project consists of a 60-foot-wide, 8-foot-deep channel through the entrance bar in Lake Pontchartrain and removal of snags and overhanging trees from Mile 8.2 to the mouth of Bayou Lacombe.

The snagging has greatly enhanced this waterway for recreational use.

Tchefuncte River and Bogue Falaya

(New Orleans District)

This waterway, which is approximately 14 miles in length, furnishes excellent fishing, boating, and other recreational opportunities. Adjacent higher lands are rapidly being developed for private homes and campsites.

The Tchefuncte River and Bogue Falaya project was authorized in 1881 and modified in 1930 and 1958. The original 8-foot project from Covington to Lake Pontchartrain was completed in 1929.

The present project provides for a 10- by 125-foot navigation channel from a 10-foot depth in Lake Pontchartrain to about Mile 3.5 of the Tchefuncte River. From Mile 3.5 to Washington Street in Covington, via Tchefuncte River and Bogue Falaya, the channel would remain 8 feet deep.

The 10-foot enlargement below Mile 3.5 was completed in 1959. The cost of the project was \$58,342. Average annual traffic from 1978-1984 was 53,375 tons.



Lake Pontchartrain and Vicinity West End floodgate and levee enlargement

Lake Pontchartrain and Vicinity Hurricane Protection

(New Orleans District)

The project provides protection from the Standard Project Hurricane for the New Orleans metropolitan area on the East Bank of the Mississippi River, which includes portions of Orleans, Jefferson, St. Bernard, and St. Charles Parishes.

The project was authorized by the Flood Control Act of 1965. The authorized plan consisted of two basic elements: barrier complexes at Lake Pontchartrain's three main tidal entrances, and levees and floodwalls around the protected areas. Construction of the levees and floodwalls in the authorized plan began in 1966 and is continuing.

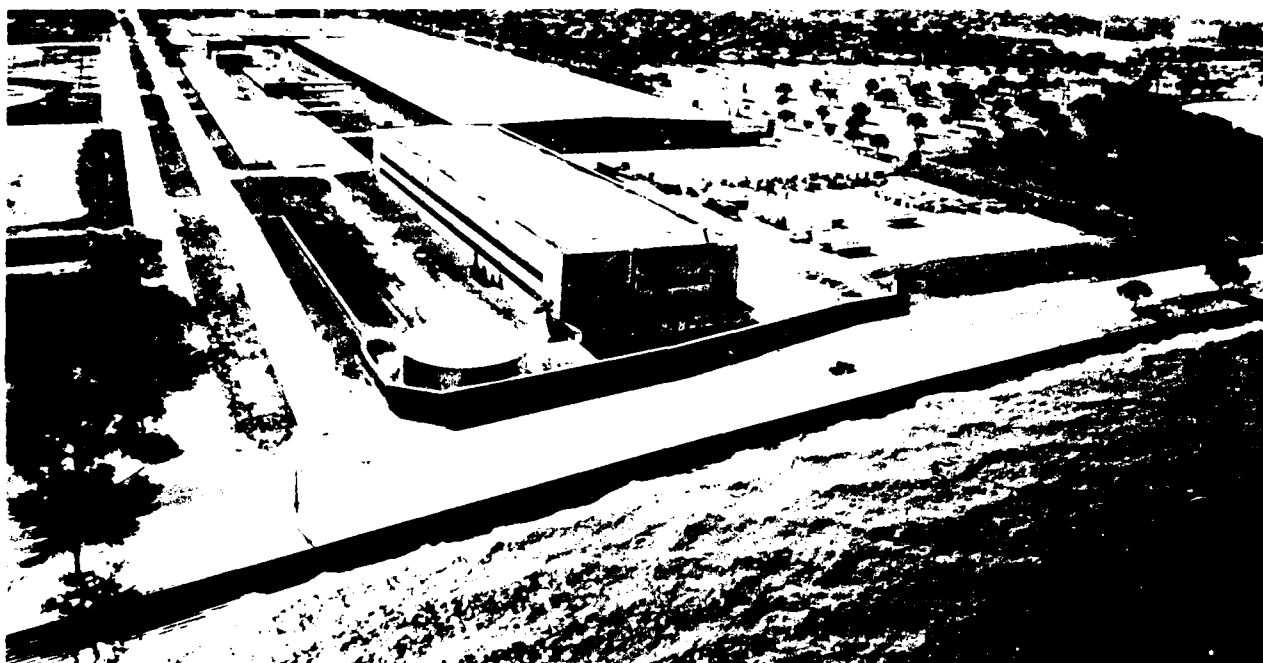
A significant amount of the levee and floodwall work has been completed in the Chalmette and New Orleans East units. No work has been done in Jefferson and St. Charles Parishes, but Jefferson Parish receives protection from a lakelront levee which was constructed under a 1950 authorization. No significant construction was accomplished on the three barrier complexes.

In December 1977 the U.S. District Court ruled that the project Environmental Impact Statement (EIS) was inadequate and issued an injunction against construction of the barrier complexes.

In response to the court injunction, a reevaluation study of the project was conducted. The conclusions of the study were that the barrier plan should be abandoned in favor of a high-level plan. The high-level plan and a supplemental EIS for the project were approved in February 1985.

The high-level plan would provide for raising and strengthening the existing hurricane protection levee systems in Orleans Parish and Jefferson Parish; completing the protection levee system in St. Bernard Parish; repairing and rehabilitating the Mandeville seawall in St. Tammany Parish; building a new main-line hurricane levee on the east bank of St. Charles Parish, just north of U.S. Highway 61 (Airline Highway); raising and strengthening the existing levee that extends along the Jefferson-St. Charles Parish boundary between Lake Pontchartrain and Airline Highway; and deferring construction of the proposed Seabrook Lock until its feasibility as a feature of the Mississippi River-Gulf Outlet navigation project could be determined. Areas which would be enclosed by the proposed levee and floodwall construction would be provided protection against tidal surge flooding resulting from the Standard Project Hurricane.

Proposed mitigation for this project would consist of protection of the Manchac Wildlife Management Area from shoreline erosion.



American Standard Floodwall, Lake Pontchartrain and vicinity

The project will cost an estimated \$682,000,000, of which approximately \$172,000,000 will be borne by non-Federal interests. Federal construction was initiated in May 1967. Federal funds in the amount of \$181,596,000 were made available through September 1986. The estimated project completion date is September 2006. When complete, the project will provide essentially complete flood protection to 105,190 acres of land, which includes 61,900 acres of urban development.

Cumulative damage prevented under present conditions with project in full operation is estimated at \$799,073,000, through September 1984.

Lake Pontchartrain, North Shore, Louisiana

(New Orleans District)

This project, authorized by the Water Resources Development Act of 1986, provides for the Federal assumption of maintenance of the entrance channel of Bayou Castine and for the restoration of .9 mile of beach at Fontainebleau State Park. These features are located on the north shore of Lake Pontchartrain east of Mandeville, Louisiana.

The total first cost of the project (1986) is \$1,300,000 of which \$650,000 is non-Federal. Detailed design was initiated in 1985 but was discontinued due to lack of funds.

Lake Pontchartrain Levees

(New Orleans District)

Authorized by the Flood Control Acts of 1946 and 1950, the project includes construction of 10.2 miles of levee along the Lake Pontchartrain shoreline of

Jefferson Parish; enlargement of 4.8 miles of levee along the Jefferson-St. Charles Parish line; and enlargement of 2.3 miles of the 17th Street Canal levee along the Jefferson-Orleans Parish line.

These levees protect about 50 square miles of residential and industrial development in Jefferson Parish from storm tides in Lake Pontchartrain. Three new highways, the New Orleans International Airport, numerous industrial and commercial enterprises, civic buildings, and hospitals are located in the area.

Authorization and construction of the levees set off an explosive economic expansion. Population increased from 54,000 in 1950 to 133,000 in 1960; in 1976, population was over 580,000; in 1980 it was 815,000, and the growth continues. Completed in 1956, the project cost \$8,303,110, including a cash contribution of \$1,350,000 by local interests. After Hurricane Betsy in 1965, the Pontchartrain Levee District raised the levees to provide added hurricane protection, expending approximately \$2,300,000.

Local interests were required to rehabilitate and improve the interior drainage system in the area. Project maintenance is the responsibility of the Jefferson Levee District.

The levees along the Jefferson-St. Charles Parish line and the Jefferson Parish lakelront will be raised to provide protection from a Standard Project Hurricane under the authority of the Lake Pontchartrain, La., and Vicinity Hurricane Protection Project. This project will also provide for a flood control structure across the land end of the 17th Street canal at the Orleans-Jefferson Parish line.

Through September 1986, the project had prevented

cumulative flood damages estimated at \$2,193,362,000, including \$21,800,000 for Hurricane Flossy (September 1956), \$110,000,000 for Hurricane Carla (September 1961), \$98,000,000 for Hurricane Hilda (October 1964), \$70,000,000 for Hurricane Betsy (September 1965), \$50,000,000 for Hurricane Camille (August 1969), \$228,500,000 for Hurricane Carmen (September 1974), and \$21,500,000 for Hurricane Babe (September 1976). Additional benefits were accrued during the floods of 1973, 1974, and 1975.

Pass Manchac

(New Orleans District)

Pass Manchac provides access to Lakes Pontchartrain, Maurepas, and adjacent areas for fishing, crabbing, and hunting. The Louisiana Department of Highways is allowing an abandoned highway bridge to be used as a fishing pier. Launching ramps and commercial facilities are available at U.S. Highway 51.

Average annual traffic from 1979-1984 was 341,681 tons. Major cargo in the pass is marine shells.

Authorized in 1910, the project called for removal of snags, logs, and other obstructions from the bars at the entrance of the pass and throughout its length between Lake Maurepas and Pontchartrain. The 7-mile channel was completed in 1912 at a cost of \$1,374.

Tangipahoa River

(New Orleans District)

This project, completed in 1884 at a cost of \$11,500, provides for removal of overhanging trees, snags, and obstructions on the lower 53.5 miles of the river. Intermittent maintenance is required.

Excellent opportunities for water-based recreation are available in this area. Ponchatoula Beach, a popular state-developed area for swimming and picnicking, Lee's Landing, and Bedico Creek open the waterway to the public.

The project authorized under Section 107 of the River and Harbor Act of 1960, as amended, further enhances the excellent recreational potential of this waterway.

Tangipahoa River Navigation

(New Orleans District)

A boat channel through the bar in Lake Pontchartrain at the mouth of the Tangipahoa was completed in January 1971. Authorized under Section 107 of the River and Harbor Act of 1960, as amended by Section 310 of the River and Harbor Act of 1960, the project provides an 8-by 10-foot navigation bar entrance channel in Lake Pontchartrain. The Federal cost of this Section 107 project was \$61,211. Local interests contributed \$29,346.

Tickfaw, Natalbany, Ponchatoula, and Blood Rivers

(New Orleans District)

These beautiful waterways provide excellent opportunities for fishing, boating, and skiing. Public access is available at Wadeshoro and Springfield. Commercial facilities are located on the Natalbany,



Louisiana turtle

Blood, and Tickfaw Rivers. Average annual traffic from 1977-1981 was 2,360 tons.

Authorized work includes removal of obstructions in the Tickfaw River from its mouth to Mile 26, in the Blood River from its mouth to the head of navigation, about Mile 4, and in the Natalbany and Ponchatoula Rivers for a distance of 15.5 miles. The project was completed in 1921 at a cost of \$8,115.

Emergency Flood Activities (PL-84-99). Flood fighting is authorized under this law. A slowly moving cold front dumped up to 13-inches of rain in the Pontchartrain Basin from 5-8 April 1983, raising flooding and record or near record stages on rivers and streams. Assistance to affected parishes included the loan of over 250,000 sandbags and eight pumps. On 20 April 1983, Ascension, East Baton Rouge, East Feliciana, Jefferson, Livingston, Orleans, Pointe Coupee, St. Bernard, St. Tammany, and Washington Parishes were declared disaster areas by President Ronald Reagan.

Small Projects

Snagging and clearing were completed on the following streams in the Lake Pontchartrain Basin under the authority of Section 2 of the 1937 Flood Control Act, which was amended by Section 208 of the 1954 Flood Control Act.

<i>Stream</i>	<i>Length (miles)</i>	<i>Date</i>	<i>Cost</i>
Bayou Vincent*	1.4	1947	\$13,000
Bayou Francois*	8.2	1948	13,500
New River*	8.7	1948	31,500
Ponchatoula Creek	3.3	1949	10,464
Sellers Creek	4.5	1950	4,958
Yellow Water River	2.8	1950	3,136
Natalbany River*	5.0	1954	71,043
Tickfaw River	16.3	1958	50,107

* Also improved by enlargement



Recreation on Tickfaw River

Programs and Surveys

Flood Plain Information Reports

Baton Rouge No. 1 (New Orleans District). A flood plain information report on Bayou Fountain in Baton Rouge was completed and published in 1971 at a cost of \$29,985.

The study area encompasses Bayou Fountain from its confluence with Bayou Manchac upstream to Mile 13.3. The report indicates that the lower portion of the area is subject to backwater flooding and the upper reaches are subject to headwater flooding. Backwater flooding has been reduced by the Amite River and Tributaries project.

Baton Rouge No. 2 (New Orleans District). A flood plain information report on Ward Creek and tributaries in Baton Rouge was completed in 1972 at a cost of \$27,402.

The study covers Ward Creek and tributaries from Ward Creek confluence with Bayou Manchac to Mile 12.6. The lower portion of the area is subject to backwater flooding, and the upper reaches, to headwater flooding. The report includes a history of flooding along Ward Creek and its tributaries. It identifies areas subject to possible future floods and furnishes a suitable basis for the adoption of land-use control to guide flood plain development.

Baton Rouge No. 3 (New Orleans District). A flood plain information report on the Claycut Bayou and Jones Creek area in the vicinity of Baton Rouge was completed in 1974 at a cost of \$26,000.

The study covers Claycut Bayou from Mile 0 at Amite River to above Mile 10 and Jones Creek from Mile 0 at Amite River to about Mile 12. The report indicates that the area is subject to headwater flooding. During high stages on the Amite River, the lower reaches of streams are subject to backwater flooding.

Baton Rouge No. 4 (New Orleans District). A flood plain information report on Hurricane Creek, Monte Sano Bayou and tributaries in and near the city of Baton Rouge was completed in 1976 at a cost of \$32,000.

The study covers Hurricane Creek, Monte Sano Bayou and tributaries from Hurricane Creek confluence with Comite River and a portion of the Comite River to the Scotlandville and Gibbens Laterals, north of Scotlandville. The report indicates that while most of the stream channels in the study area have been improved since 1959, the threat of backwater flooding along lower Hurricane Creek from the Comite River and along lower Monte Sano Bayou from the Mississippi River remains significant.

Baton Rouge No. 5 (New Orleans District). A flood plain information report for areas of East Baton Rouge and Baker that would be flooded from the Comite River, Cypress Bayou, and tributary streams (the South, East, and West Laterals, and Gibbens Lateral) was completed in 1976 at a cost of \$35,000.

Developments within the flood plains of these streams experienced considerable damage during the floods of 1953, 1962, 1964, and 1967. Other floods known to have produced property damage include those of 1947 and 1973. Since 1962, a series of channel improvement projects have been accomplished in the Cypress Bayou Basin and on the lower Comite River. During this period, approximately 11.3 miles of channel were improved along the study reaches. Although these projects have lowered flood heights markedly in some areas, studies indicate that a potential flood threat still remains.

Covington (New Orleans District). A flood plain information report on the Covington area was completed in 1971 at a cost of \$29,947.

The study covers Tchetafune River from Mile 10.5 to 29, Bogue Falaya River from Mile 0 to 13.3, and Little Bogue Falaya River from Mile 0 to 4.1. The three streams are subject to headwater flooding. The report includes a history of flooding in the Covington area, identifies those areas that are subject to possible future floods, and provides a suitable basis for the adoption of land-use control to guide flood plain development.

Gonzales (New Orleans District). A flood plain information report on the Gonzales area was completed in 1971 at a cost of \$33,483.

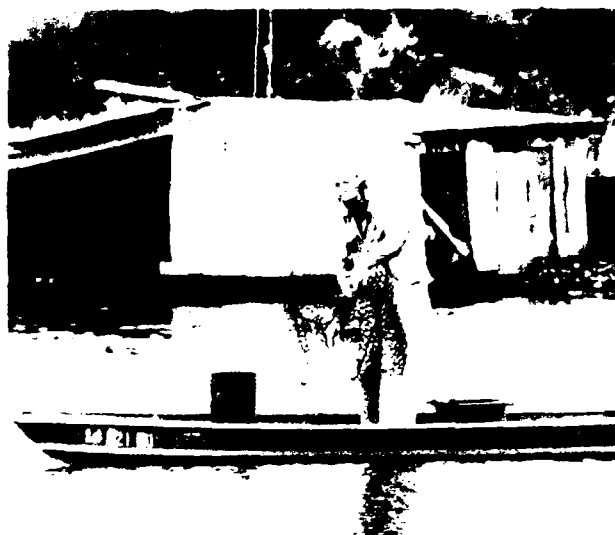
The study area encompasses New River from Mile 11.2 to 22, Bayou Francois from Mile 4.9 to 10.5, and Bayou Black from Mile 8.1 to 12.8. The report indicates that flood problems in this area are due to headwater flooding. The report includes a history of flooding in Gonzales and vicinity, identifies areas subject to possible future floods, and provides a basis for the adoption of land-use controls to guide flood plain development.

Slidell (New Orleans District). A flood plain information report on Slidell and vicinity was completed in 1971 at a cost of \$26,981.

The study covers the following streams: Bayou Bonfouca from Mile 4.1 to 6.8, Bayou Vincent from Mile 0 to 3.6, W-14 Main Diversion Canal from Mile 1.4 to 7.7, Doubloon Branch from Mile 1.7 to 3.5, and French Branch from Mile 0 to 3.5. Most of these streams are subject to a combination of tidal and headwater flooding. There are no existing comprehensive flood control projects that would benefit the entire watershed. However, when completed, the Lake Pontchartrain and Vicinity Hurricane Protection project will significantly reduce flooding from hurricanes in Slidell and vicinity.

Flood Insurance Studies

Under the National Flood Insurance Act of 1968 (PL 90-448) and the Flood Disaster Protection Act of 1973



Fisherman

(PL 93-234), the Corps of Engineers conducted flood insurance studies for HUD. The Federal Emergency Management Agency (FEMA) now has that responsibility. Insurance studies that have been completed in the Lake Pontchartrain Basin are:

Ascension Parish
Baton Rouge, East Baton Rouge, and Baker
Covington
East Baton Rouge Parish
Gonzales
Grammercy
Harahan
Jefferson Parish
Kenner
Lutcher
Madisonville
Mandeville
Orleans Parish
St. John the Baptist Parish
St. Tammany Parish
Slidell
Sorrento
Jefferson Parish (Type 19)
Kenner (Type 19)
Harahan (Type 19)
Orleans Parish (Type 19)
Pearl River
Abita Springs
St. Tammany Parish (Type 19)
Livingston Parish

Insurance studies that are under way are:

St. Charles Parish
St. Helena Parish

Surveys Authorized Or Under Way

Amite River and Tributaries (New Orleans District). The purpose of the study is to investigate the feasibility of providing improvements for flood control and other water related land resource needs, including water supply, water quality control, recreation, and fish and wildlife enhancement. The study area has experienced

four major floods between 1972 and 1983: 1973, 1977, 1979, and 1983. Flood damages in 1983 exceeded \$170 million. A reconnaissance scope study was initiated in September 1983 and was completed in December 1984. The reconnaissance study indicated that enough of the improvements were economically feasible to warrant proceeding to the feasibility phase. Feasibility phase studies were initiated in March 1985, and are scheduled to be completed in 1990.

Bayou Bonfouca (New Orleans District). This study will determine if the existing project should be modified in any way, particularly in regard to providing a more favorable alignment between Lake Pontchartrain and the shipyards at Slidell. The study has not been funded.

Lake Pontchartrain, Jefferson Parish (New Orleans District). This study will determine the advisability of providing interim hurricane protection until completion of the Lake Pontchartrain and vicinity hurricane protection project. The study has not been funded.

Lake Pontchartrain, West Shore (New Orleans District). This study will review the Lake Pontchartrain and vicinity project with particular reference to

providing for hurricane protection and flood control in St. James and St. John the Baptist Parishes and that part of St. Charles Parish west of the Bonnet Carré Spillway. The study is scheduled for completion in 1990.

Mississippi and Louisiana Estuarine Areas (New Orleans District). This study comprised a review of the report on the MR&I project and other pertinent reports, with a view toward determining the advisability of providing fresh water in Lakes Maurepas, Pontchartrain, Borgne, and Mississippi Sound areas in the interest of improving the wildlife and fisheries resources in these areas. The final feasibility report and environmental impact statement were completed and submitted to higher authority in May 1984. The report recommends that a freshwater diversion structure and associated facilities be constructed just north of Bonnet Carré Spillway.

The Mississippi River Commission approved the recommended plan on January 10, 1985, with minor modifications. The report and FIS were forwarded to the Secretary of the Army in May 1986.

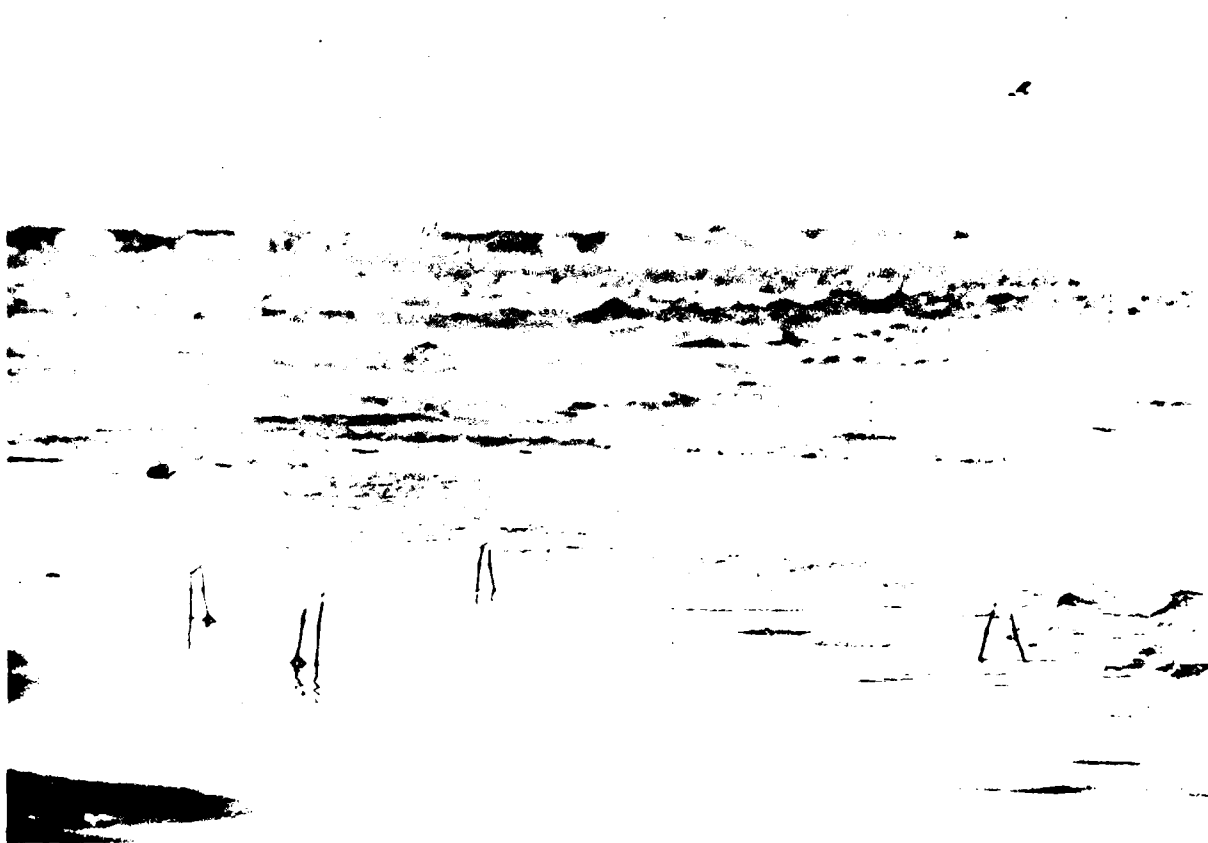
Preconstruction engineering design was initiated in October 1984 and completion is scheduled for September 1989.

Mississippi River Delta Area to the East Atchafalaya Basin Protection Levee

Introduction

The Mississippi River delta portion of the Louisiana coastal area is in the lower southeastern region of the state, east of the East Atchafalaya Basin Protection Levee (EABPL). Improvements have been authorized

for purposes of navigation, flood control, beach erosion control, hurricane protection, recreation, and other associated uses.



Wading birds



Mississippi River Delta Area to the East Atchafalaya Basin Protection Levee

PROJECTS



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Projects

Barataria Bay Waterway (New Orleans District)

The River and Harbor Act of March 1919 authorized a dredged channel, 5 feet deep by 50 feet wide, from Bayou Villars to Grand Isle, a distance of 37 miles. The project was completed in 1925 at a cost of \$73,037.

A modification was authorized by the River and Harbor Act of 3 July 1958, to provide for a channel approximately 37 miles long with a 12-foot depth and 125-foot width at mean low Gulf from its beginning at the Gulf Intracoastal Waterway to Grand Isle. The channel follows the route of the previous project to Mile 15.5, in Bayou St. Denis, thence by a relocated channel along the western shore of Barataria Bay and through Barataria Pass to the 12-foot depth contour in the Gulf of Mexico, with a 4.3-mile extension of the project to include the westerly 4.3 miles of Bayou Rigaud. The project modification was completed in November 1963.

In addition, authority was granted in October 1967, under provisions of the River and Harbor Act of 1915, to enlarge the bar channel from 125 to 250 feet between Mile 1.26 and the 12-foot contour. The enlargement was accomplished in 1967 at a cost of \$204,400. In 1978, authority was granted to increase project dimensions in the bar entrance channel to 15 feet mean low Gulf by 250 feet wide, from Mile 0 to the 15-foot contour in the Gulf of Mexico.

When possible, marsh is created with material dredged during waterway maintenance.

Average annual traffic from 1977-1981 was 1,827,105 tons, consisting mainly of oil industry cargo and liquid sulphur. Opportunities for recreational boating and fishing are plentiful throughout the area. The *Lovageur*, the *Bayou Jean Lafitte*, and the *Mark Twain*, three popular excursion boats, operate on regular schedules between New Orleans and Lafitte to show visitors the colorful and historic bayou country.

The waterway and adjacent waters below Lafitte are used extensively by commercial fishermen and oystermen. Special events, such as the pirogue races at Barataria and the fishing rodeos at Grand Isle, add to the value of the waterway for recreational purposes.

Bayou Dupre (New Orleans District)

The oil industry provides the major cargo on this waterway, although it is heavily used by recreational craft moving between Violet and Lake Borgne. Average traffic from 1977-1981 was 137,535 tons.

This project includes a 6-foot-deep channel from the highway bridge at Violet to deep water in Lake Borgne with widths of 80 feet in the canal and bayou and 100 feet in the lake. In addition to the 7.3-mile channel, the project includes a turning basin 100 feet wide and 200

feet long at Violet. The Violet Lock, a privately owned connection with the Mississippi River, was permanently closed in 1950. The project was completed in 1939 at a cost of \$38,915.

Grand Isle Hurricane Protection and Beach Erosion (New Orleans District)

Because of Grand Isle's location and topography, improvements on the island are subject to damage from erosion along its gulf shore and passes and from the combined effects of winds and tides generated by hurricanes. Grand Isle is located on the Gulf of Mexico in Jefferson Parish and is one of the many low, irregular islands separated by bays, lagoons, and bayous, which form a part of the shoreline of Louisiana. It is a base of operation for large offshore petroleum and sulphur industries and is a commercial and sport fishing center. It is also an important recreational area for residents of Louisiana and nearby states.

The current project, authorized in October 1976 under the authority of Section 201 of the Flood Control Act of 1965 (PL 89-798), provides for hurricane protection and prevention of beach erosion for the island. The plan of improvement provides for the construction of a sandfilled berm and a vegetated and sandfilled dune extending the length of Grand Isle's gulf shore, and a jetty to stabilize the western end of the island of Caminada Pass. The jetty on the western end of the island has been constructed by the State of Louisiana and will be credited toward the state's share of the project's first cost. The dune and vegetation contract was completed in the summer of 1985.

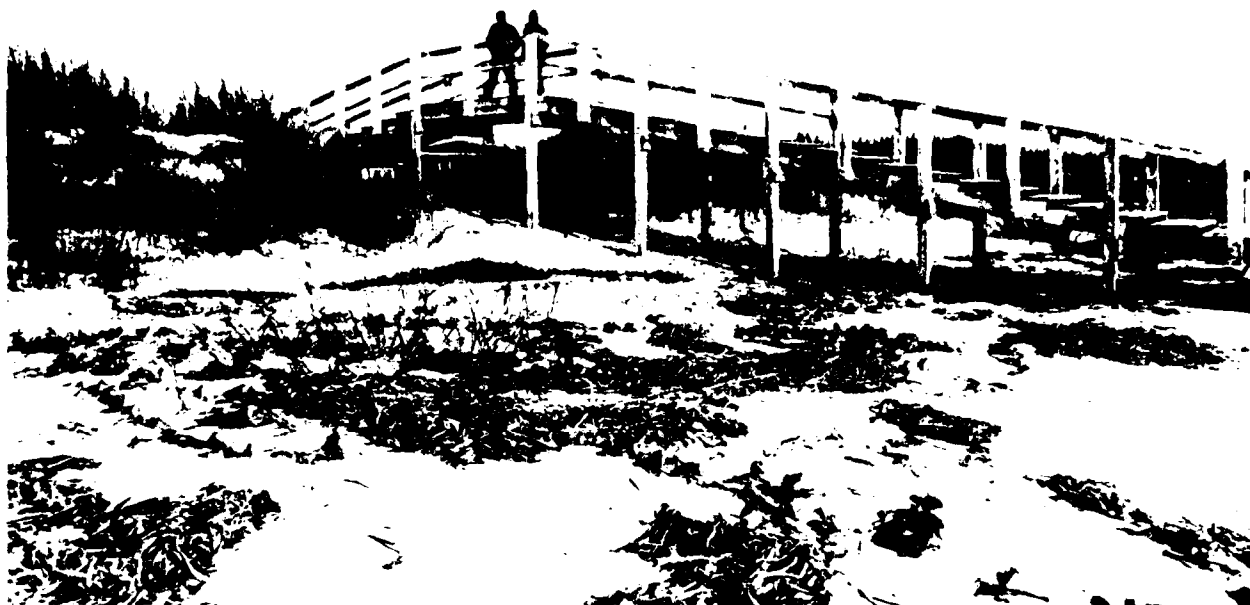
In late 1985, the Grand Isle project was damaged by Hurricanes Danny, Elena and Juan. Approximately 6,000 feet of dune was completely lost, about 14,000 feet was partially lost, and the remaining 18,000 feet sustained no damage. It is estimated the dune was instrumental in preventing an estimated \$12,000,000 in damages.

Restoration of the project will be accomplished by two separate contracts, the first scheduled for award in 1987 and the second in 1989.

Bayou Grosse Tete (New Orleans District)

Snagging, clearing, and dredging were authorized in 1912 to secure a 29-mile navigation channel 5 feet deep at mean low water and 60 feet wide from the mouth of Bayou Plaquemine to 5 miles above the town of Maringouin. A channel 8 by 60 feet was completed between Mile 0 and 10.3 in 1914, and a channel 8 by 40 feet was completed to Mile 29 in 1916.

Completion of the channel between Mile 10.3 and 29.0 to project dimensions 8 by 60 feet was completed in 1971.



Hurricane erosion at Grand Isle

lack of excavated material disposal areas within a reasonable distance of the necessary excavation. This uncompleted portion of the work has been classified as inactive.

The cost of the work completed in 1916 was \$29,392. There was no commercial traffic reported from 1978-1984.

Bayou Lafourche and Lafourche-Jump Waterway (New Orleans District)

Features of the original project, authorized in 1935, include permanent closure of the head of Bayou Lafourche without a lock, a channel 6 by 60 feet from Napoleonville to Lockport, a channel of the same dimensions from the Gulf Intracoastal Waterway at Larose to the Gulf of Mexico with a jettied entrance at Belle Pass, and the closure of Pass Fourchon.

Construction of improvements for the bayou below Larose was completed in 1941 at a cost of \$524,024. That portion of the project between Thibodaux and the head of the bayou at Donaldsonville was deauthorized in 1967, and the work between Thibodaux and Lockport is inactive because of the lack of rights-of-way and excavated material disposal areas.

The project was modified by the River and Harbor Act of 1960 to provide for a channel 9 feet deep and 100 feet wide from Golden Meadow to Leeville, a channel 12 feet deep and 125 feet wide from Leeville to the Gulf, including modification and extension of the jetties to the 12-foot depth contour if advisable, and an auxiliary channel 12 feet deep and 125 feet wide extending from the Gulf Intracoastal Waterway west of Larose to Bayou Lafourche below Leeville, then

eastward through the Southwest Canal, then through new land cuts and existing channels to connect with the Bayou Rigaud section of the Barataria Bay Waterway at Grand Isle, discussed previously.

Enlargement of Bayou Lafourche between Golden Meadow and the Gulf of Mexico has been completed. Planning has been completed for the Leeville to Grand Isle channel; however, construction has not been initiated because of the failure of local interests to furnish rights-of-way for this reach and also serious environmental problems. Dredging of the auxiliary channel between Larose and Leeville has not been initiated due to right-of-way and environmental problems. Both have been classified as inactive. The total estimated cost of the modified project is \$14,297,000, of which \$9,120,000 is Federal and \$5,160,000 is non-Federal. An additional \$17,000 will be spent by the U.S. Coast Guard for navigation aids.

Average annual traffic on Bayou Lafourche from 1979-1984 was 935,000.

Bayous LaLoutre, St. Malo, and Yscloskey (New Orleans District)

This 30-mile project has been used by oil companies as a safe, inland route for transporting crude oil, drilling equipment, and personnel.

The channels are, however, presently used mainly by commercial trappers and fishermen en route to Lake Borgne, Chandeleur Sound, and intervening waterways and marsh areas. Excellent commercial launching and boat rental facilities are available in the area, further enhancing the recreational potential. Average annual traffic from 1979-1984 was 22,210 tons.

Initially authorized in 1937 and modified in 1945, the project was completed in May 1956 at a cost of \$96,916.

As modified, the project provides for a 5- by 40-foot channel from deep water in Lake Borgne to the shoreline at the mouth of Bayou Yseloskey; a 6- by 40-foot channel from deep water in Lake Borgne through Bayous St. Malo, LaLoutre, and Floi, to deep water in Lake Floi; and a 5- by 30-foot channel in Bayou LaLoutre between Hopedale and Bayou St. Malo.

Bayou Segnette (New Orleans District)

Improvements were made along this waterway under Section 3 of the River and Harbor Act of 1945 (PL 79-14) in 1948 and 1951. Those made in 1948, at a cost of \$20,279, consisted of reestablishing a usable navigation channel 6 feet deep and 40 feet wide between Bayou Bardeaux and the westward end of the Westwego Canal, a distance of about 6 miles.

Improvements made in 1951, at a cost of \$23,207, consisted of channel enlargement to provide an 8- by 50-foot clear channel between Mile 1.5 and 5.5.

Total cost of improvement along Bayou Segnette was \$43,486.

Bayou Segnette Waterway (New Orleans District)

Construction of a 9-foot-deep channel over a bottom width of 60 feet was authorized by the River and Harbor Act of 1954.

The authorization for this project provides for maintenance to a 6-foot depth only until such time as, at the discretion of the Chief of Engineers, maintenance to a greater depth (not to exceed 9 feet) is justified. An interim channel 8 feet deep over a bottom width of 80 feet, including overdepth, was completed in August 1957 at a cost of \$238,828. The estimated cost of construction for the authorized project is \$374,000 (1957).

The channel begins at the southern end of Company Canal at Westwego and follows the existing channel of Bayou Segnette (including its cutoffs) southward to approximately Mile 5.6, then runs southerly, via new land cut lying to the east of Lake Salvador, to the Intracoastal Waterway at Bayou Villars and the head of the Barataria Bay Waterway.

The project, 12.2 miles long, affords a shorter and direct route for the larger modern fishing and shrimping boats to the packing and canning industries on Bayou Segnette. The average annual traffic on the waterway from 1979-1984 was 740 tons.

Bayou Terre Aux Boeufs (New Orleans District)

This bayou, which serves as a boundary line between Plaquemines and St. Bernard Parishes, was snagged and cleared between Mile 10.5 and 18.25, and excavated, snagged, and cleared between Mile 18.25 and 19.5. Authorized under the provisions of Section 3,

River and Harbor Act of 1945 (PL 79-14), this 5- by 50-foot navigation channel was completed in 1951 at a cost of \$24,832.

Bayou Terrebonne (New Orleans District)

Operational supplies for drilling for crude oil comprise the major cargo on this waterway, which was completed in 1916 at a cost of \$120,089. The waterway also serves as an access route for fishing and hunting in the coastal region. Average annual traffic from 1979-1984 was 395,353 tons.

The Bayou Terrebonne project consists of a 6-foot-deep channel of suitable width from Bush Canal to the St. Louis Cypress Company Bridge at Houma, a distance of 24 miles. The channel was authorized in 1910, with modifications in 1912, 1913, 1959, and 1964. The 1959 and 1964 modifications authorized abandonment of about 1 mile of the channel in Houma.

Choctaw Bayou (New Orleans District)

This Section 205 project will provide flood protection to an area of 9,200 acres, just west of Port Allen, by snagging, clearing, and excavating a channel on Choctaw Bayou and its tributaries. The project was approved in 1968; construction was initiated in 1973 and completed in 1976. The total Federal cost of the project was \$840,700; the total non-Federal cost has not been finalized.

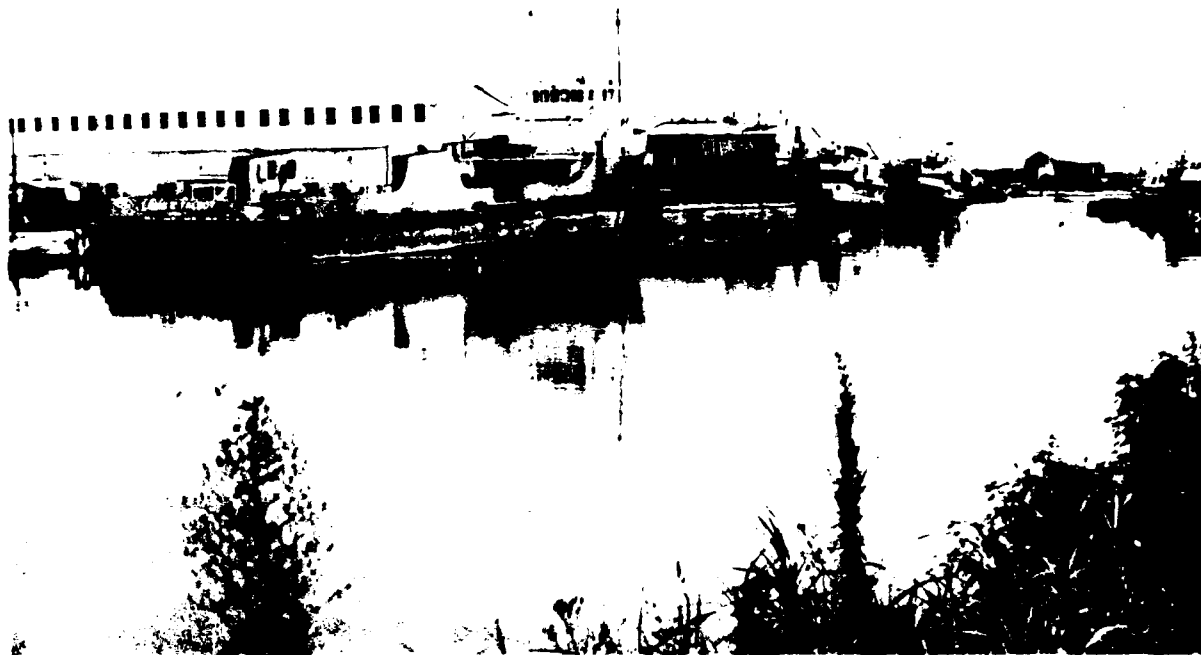
Harvey Canal-Bayou Barataria Levee (New Orleans District)

This project consists of construction of a levee along the Gulf Intracoastal Waterway in Jefferson Parish, between Roussel Pumping Station and Cousins Canal; enlargement of the existing levee from Cousins Canal to Mile 6; and a new levee from Mile 6 to Louisiana State Highway 45, near Crown Point. The plan for improvement also includes construction of a new pumping station by local interests. However the Environmental Protection Agency has invoked Section 404(C) of the Clean Water Act, so no pumping station will be built.

The levee embankment will be constructed in two lifts. Construction of the first lift was initiated in 1971 and was completed in 1974. Work on the second lift has not begun and its completion is subject to pending litigation. The estimated project cost (1976) is \$1,000,000 Federal and \$5,020,000 non-Federal. The \$1,000,000 Federal portion was expended on the first lift and the project turned over to the local assuring agency (Jefferson Parish Council) for project completion. Construction of the previously described west bank levee would remove the necessity to complete this levee.

Houma Navigation Canal (New Orleans District)

The channel, 15 feet deep at mean low Gulf level over a bottom width of 150 feet, allows navigation from the



Industry along Harvey Canal

Gulf Intracoastal Waterway near the western edge of Houma to the Gulf of Mexico. Federal maintenance of this canal, completed by non-Federal interests in 1962, was officially assumed in 1963. Maintenance cost to date is \$18,827,749. Authority was granted on August 23, 1973 to increase the channel dimensions to 12 feet by 300 feet between Mile 0 and the 18-foot contour in the Gulf of Mexico.

During the period from 1979-1984, traffic on this waterway averaged 1,250,000 tons annually, with the oil industry contributing the major cargo.

Larose to Golden Meadow Hurricane Protection (New Orleans District)

This project, authorized by the Flood Control Act of 1965, protects highly developed residential and commercial areas along Bayou Lafourche between Larose and Golden Meadow from storm tides and hurricane floodwaters. The project area is of great economic importance to the State of Louisiana, and includes lands and improvements having an aggregate value of approximately \$159,900,000 (1984 prices). The project includes enlargement of 3 miles of existing levees and construction of about 43 miles of new levees, 8 miles of low interior levees, two major floodgates in Bayou Lafourche, and several flap-gated drainage culverts. At the request of local interests, the culverts have been replaced with pumping stations. Local interests will bear the difference in cost. The estimated Federal cost (September 1986) is \$64,000,000, the non-Federal cost, including a cash contribution of \$13,578,000, is \$27,400,000. Project construction was

initiated in 1975 and is currently scheduled for completion in 2000. Approved mitigation for this project consists of water level management for marsh preservation on the Pointe au Chien Wildlife Management Area.

Little Caillou Bayou (New Orleans District)

Completed in 1929, this 20-mile channel, 5 feet deep and 40 feet wide, from Robinson Canal to the head of Little Caillou Bayou, cost \$77,761. Average annual traffic from 1979-1984 was 540,684 tons.

Mississippi River-Gulf Outlet (New Orleans District)

New Orleans is the gateway to the great system of inland waterways of the central valley of the nation. Adequate outlets to the Gulf of Mexico are essential for economical transportation to and from this port. The Mississippi River-Gulf Outlet (MRGO) affords a tidewater outlet to the Gulf that is about 37 miles shorter than the Mississippi River route.

The channel also provides a potential for harbor development large enough for dispersion of docks and cargo handling facilities, thus allowing more flexibility in operation for inland and seagoing commerce. Safety to navigation and time reduction in hazards, and reduction in cost of cargo handling are also important.

For project information, contact: PL-455, U.S. Army Corps of Engineers, New Orleans District, 1000 Poydras Street, New Orleans, LA 70112. For more information, contact: Mr. Robert P. Gaudin, Chief, Mississippi River-Gulf Outlet, New Orleans District, 1000 Poydras Street, New Orleans, LA 70112.

a ship channel 36 feet deep and 500 feet wide, extending approximately 76 miles in a land and water cut from the junction of the Inner Harbor Navigation Canal and the Gulf Intracoastal Waterway in New Orleans to the 38-foot contour in the Gulf. Jetties for the reduction of shoaling, a turning basin, and a lock and connecting channel with the Mississippi River are principal features of the project.

From the junction of the Gulf Intracoastal Waterway and the Inner Harbor Navigation Canal, the channel follows the Gulf Intracoastal Waterway to the vicinity of Highway 47 (Paris Road), where it proceeds in a southeasterly direction along the south shore of Lake Borgne, through the marshes, across Chandeleur Sound between Breton and Grand Gosier Islands, and to the 38-foot contour in the Gulf of Mexico. In the open waters of the Gulf, the channel dimensions increase to 38 by 600 feet.

Construction of the channel was initiated in March 1958. An interim channel 36 by 250 feet was opened to traffic in July 1963. Enlargement of the channel to full project dimensions was completed in 1968.

The turning basin has been constructed at the intersection of the MRGO channel and the Inner Harbor Navigation Canal. A fixed, high-level 4-lane highway bridge at Paris Road has also been constructed, under a reimbursable agreement with the Louisiana Department of Highways. The jetties have been completed to the 6-foot contour. The south dike has been extended about 5.3 miles (Mile 14.9 to 20.2). Further jetty construction has been deferred, as dredging has proven more economical for maintaining the Breton Sound reach.

A study is in progress to determine the feasibility, both engineering and economic, of replacing the existing Inner Harbor Navigation Canal Lock, which has dimensions of 75 feet by 626 feet long and 31.5 feet deep. Completion of this study is anticipated by the end of 1990.

Foreshore protection along the south bank of the MRGO from the Industrial Canal to the end of the Chalmette hurricane protection levee is also a feature of this project. This feature is critically needed to arrest bank degradation occurring along the south bank of the MRGO, which could eventually affect the levees. A contract for \$7.4 million was awarded in June 1985 for foreshore protection from the Bayou Bienvenue Control Structure to the end of the Chalmette hurricane protection levee. It was completed in 1986.

Traffic on the MRGO decreased to 6,916,000 tons in 1985 from 8,035,000 in 1984. The average annual traffic from 1979-1984 was 6,109,000 tons. Major types of cargo moving over the channel include primary metal products, nonmetallic minerals, cement products and metallic ores. The total project costs are estimated (October 1987) to be \$809,000,000 Federal and \$273,800,000 non-Federal. This is traditional cost sharing. PL 99-662 cost sharing will be applied to this project when a plan for a new ship lock is determined. In addition, the U.S. Coast Guard is to provide

navigation aids at a cost of \$45,000. Federal funds in the amount of \$88,867,000 were allotted through September 1987.

The Board of Commissioners of the Port of New Orleans has established container ship and roll-on, roll-off facilities and a bulk commodity handling facility on the channel reach.

Mississippi River-Gulf Outlet, Michoud Canal (New Orleans District)

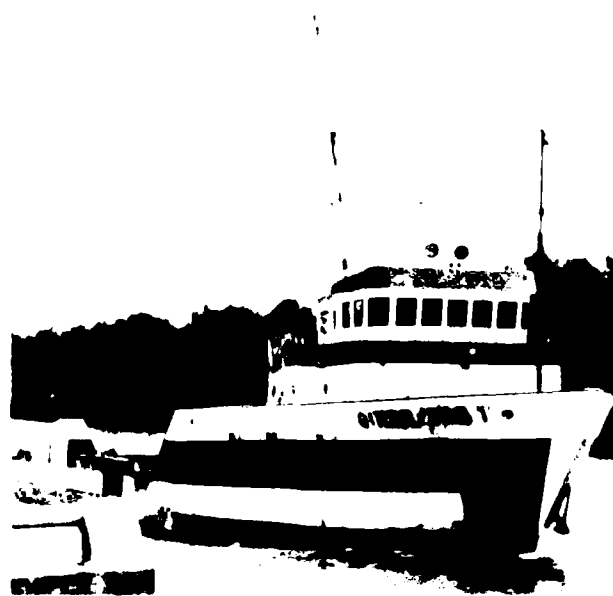
The project provides a 36- by 250-foot ship channel, extending from the MRGO, along a part of the Gulf Intracoastal Waterway and through the Michoud Canal. An 800- by 800-foot turning basin is located in the northern end of the project.

Michoud Canal currently serves barge traffic to and from plants manufacturing chemicals and portland cement. The channel serves the added purpose of providing direct foreign export of fertilizers. Public wharf facilities are to abut the turning basin.

The project was authorized by the River and Harbor Act of 1968. The total construction cost was \$2,770,000. Construction was initiated in 1974 and was completed that same year.

New Orleans to Venice Hurricane Protection (New Orleans District)

Because the developed areas along the Mississippi River below New Orleans are particularly vulnerable to hurricane flooding, increased protection was authorized by the River and Harbor Act of 1962, under the title "Mississippi River Delta at and Below New Orleans." Features of the project include increasing the height and cross section of the existing back levees, constructing new back levees, and modifying existing drainage facilities, and raising the West Bank



Service tugboat

Mississippi River levee from City Price to Fort Jackson to exclude tidal surges coming from the marshes to the east. Damages under present conditions are estimated at \$523,300,000 (1986 price levels).

The total project costs are estimated to be \$167,100,000 for the Federal Government and \$72,000,000 for non-Federal interests. Location and estimated (October 1986) total costs are:

Location	Estimated Cost
Reach A City Price to Empire	\$ 93,934,000
Reach B1 Empire to Fort Jackson	42,277,000
Reach B2 Fort Jackson to Venice	37,043,000
Reach C Phoenix to Bohemia	27,251,000
West Bank Mississippi River levee City Price to Fort Jackson	100,880,000
Total	\$321,000,000

Construction was initiated in August 1968 on Reach B1 near Empire. The Empire floodgate on Reach B1 has been completed and was placed in operation in early 1976. The remaining construction is continuing on this reach. Construction was initiated on Reach B2 in 1974 and is continuing. Under an agreement with the Corps of Engineers, the construction of Reach C levee, currently 80 percent complete, was accomplished by local interests. Local interests have been given credit for cost incurred for this reach as part of the 30 percent required non-Federal participation for the entire project. The project completion date is scheduled for September 2013. Mitigation for this project consists of marsh creation by delta splays. One splay has been made and is accreting marsh.

Waterway from Empire to the Gulf of Mexico (New Orleans District)

Authorized in 1946 and completed in 1950 at a cost of \$1,068,142, this project consists of a 9-by-80-foot channel from Doullut Canal, near Empire, southward to the Gulf. Extension of the existing jetties from the 6-foot contour to the 9-foot contour is authorized. The jetties will be extended if it becomes apparent that such extension would be more economical than maintenance dredging.

The needs of a large fishing fleet and those of adjacent industrial operations are served by this 10-mile channel from Empire to the Gulf of Mexico. The Mississippi River Delta and the Gulf of Mexico are important to the Empire area and the project is essential to the economic well-being of the area. The project is authorized by the Rivers and Harbors Act of 1950, as amended, and the Flood Control Act of 1937, and subsequent modifications.

Waterway from the Intracoastal Waterway to Bayou Dulac

(New Orleans District)

This waterway, 5 feet deep and 40 feet wide, extends from the Gulf Intracoastal Waterway at Houma, through Bayous LeCarpe, Pelton, and Grand Caillou to Bayou Dulac, a distance of about 16.3 miles. The project was completed in 1938 at a cost of \$51,300.

Modification of this project to provide a channel 10 feet deep and 45 feet wide in Bayou LeCarpe from the Gulf Intracoastal Waterway to the Houma Navigation Canal was authorized by the River and Harbor Act of 1962. The modification was completed in 1964, at a Federal cost of \$78,342. The average annual traffic over this waterway from 1979-1984 was 606,706 tons.

Small Projects and Studies

Fort Livingston, Grand Terre Island (New Orleans District). This beach erosion control study was conducted for the purpose of determining the feasibility of providing protection from erosion for Fort Livingston, which is listed on the National Register of Historic Places. This project would result in benefits primarily to recreation. Since current policy stipulates that projects having primarily recreational outputs are to be the sole responsibility of the non-Federal public and private sectors, all engineering and design work on this project has been suspended.

Bayou Grand Caillou (New Orleans District). This navigation project consists of enlarging Bayou Grand Caillou from Bayou Provost to the Houma Navigation Canal. Mitigation consists of marsh creation with dredged material. Initiation of construction of this project is awaiting authority to proceed.

Forty Arpent Canal (New Orleans District). This study is being conducted to determine the feasibility of providing flood control improvements to the area between Paris Road and Violet in St. Bernard Parish. The study is scheduled for completion in 1988.

Florida Walk Canal (New Orleans District). This study is being conducted to determine the feasibility of providing flood control improvements to the area between Arabi and Paris Road in St. Bernard Parish. The study is scheduled for completion in 1988.

Snagging and clearing of 8.2 miles of Bayou L'Eau Bleue in 1948, at a cost of \$44,081, were accomplished under the authority of Section 2 of the Flood Control Act of 1937, and subsequent modifications.

Emergency Projects

Natural Disaster Assistance (PL 93-288) (New Orleans District). Under this law the Corps of Engineers is authorized to cooperate with the FEMA in providing assistance to States and local governments in the event of a natural disaster.

of 5 persons and damages of \$7,500,000. Water stood 4 to 5 feet deep in some of the low-lying areas, and, as it receded, Federal and local forces marshalled their resources in preparation for the postflood recovery. On 9 May 1978, the President of the United States

declared the flooded areas a major disaster area. U.S. Army Corps of Engineers' personnel and equipment assisted other Federal and local agencies in conducting damage surveys and flood recovery operations.

Programs and Surveys

Flood Insurance Studies

Under the National Flood Insurance Act of 1968 (PL 90-448) and Flood Disaster Protection Act of 1973 (PL 93-234), the Corps of Engineers conducted flood insurance studies for HUD. The Federal Emergency Management Agency (FEMA) now has that responsibility. Insurance studies that have been completed in the Mississippi Delta area to the FABPI are as follows:

- Ascension Parish
- Donaldsonville
- Gretna
- Harvey-Gretna
- Houma
- Lafourche Parish
- Lockport
- Louisiana Gulf Coast
- Plaquemines Parish
- St. Bernard Parish, area No. 1,
Verret to Hopedale-Delacroix
- St. Bernard Parish, area No. 2,
Violet to Verret
- St. Bernard Parish, area No. 3,
Orleans-St. Bernard Parish
line to Violet
- Terrebonne Parish
- Westwego
- Gretna (Type 19)
- Harahan (Type 19)
- Jefferson Parish (Type 19)
- Kenner (Type 19)
- Orleans Parish (Type 19)
- St. Bernard Parish (Type 19)
- Westwego (Type 19)

Surveys Authorized Or Under Way

Barataria Bay Waterway, Entrance Channel and Bayou Rigaud (New Orleans District). This study, initiated in 1972, comprises a review of the existing project to determine the advisability of enlarging the entrance channel and Bayou Rigaud. Enlargement of the Entrance Channel under authority of Section 5 of the Rivers and Harbor Act of 1915 was authorized in 1978; a final negative letter report was submitted in April 1980 and the study was placed in the inactive category in January 1981.

Bayou Barataria, Bayou Perot (New Orleans District). The study was initiated to determine the advisability of providing a navigation channel from Barataria Bay Waterway, in the vicinity of Lafitte, to the Gulf Intracoastal Waterway at Bayou Perot. The study has been suspended.

Bayou Chevreuil (New Orleans District). This study is to determine the feasibility of providing channel and bank improvements along Bayou Chevreuil in the interest of flood control and drainage. The study has not been funded.

Bayou Lafourche-Lafourche Jump Waterway (New Orleans District). This study, initiated in 1986, is investigating the feasibility of Federal assumption of maintenance of the locally enlarged channel in Bayou Lafourche from mile 4.0 to the Gulf of Mexico. Local interests enlarged the 12- by 125-foot Federal channel to dimensions of 20 by 300 feet in 1968. The study is also investigating the feasibility of further channel enlargements. The reconnaissance report is scheduled for completion in 1987. The local sponsor is the Greater Lafourche Port Commission.

Gulf Intracoastal Waterway, Louisiana and Texas (New Orleans District). This study will investigate whether the existing project should be modified, particularly with regard to widening and deepening the existing and/or authorized channel. The study was initiated in 1976 and is scheduled for completion in 1990.

West Bank of Mississippi River, Vicinity of New Orleans (New Orleans District). This study was initiated in 1966 to determine the advisability of providing additional hurricane protection for the area on the west bank of the Mississippi River at and below New Orleans. The study was suspended when local interests decided to pursue the issues independently without Federal funding. After Hurricane Juan played havoc with the West Bank in the fall of 1985, Congressional interests and the West Jefferson Levee District requested the study be reactivated and expedited. The study was reactivated in January 1986 and a final report was submitted to higher authority in December 1986 for the area between Westwego and the Harvey Canal. Congress authorized construction of the recommended plan subject to final approval of the report at the Washington level. Additional studies of the area east of the Harvey Canal and the Lafitte-Barataria areas are currently on-going. Proposed mitigation consists of marsh management on the Salvador Wildlife Management Area and acquisition of 1,160 acres of woodlands in the general project area.

Vermilion River and Bayou Teche Basins

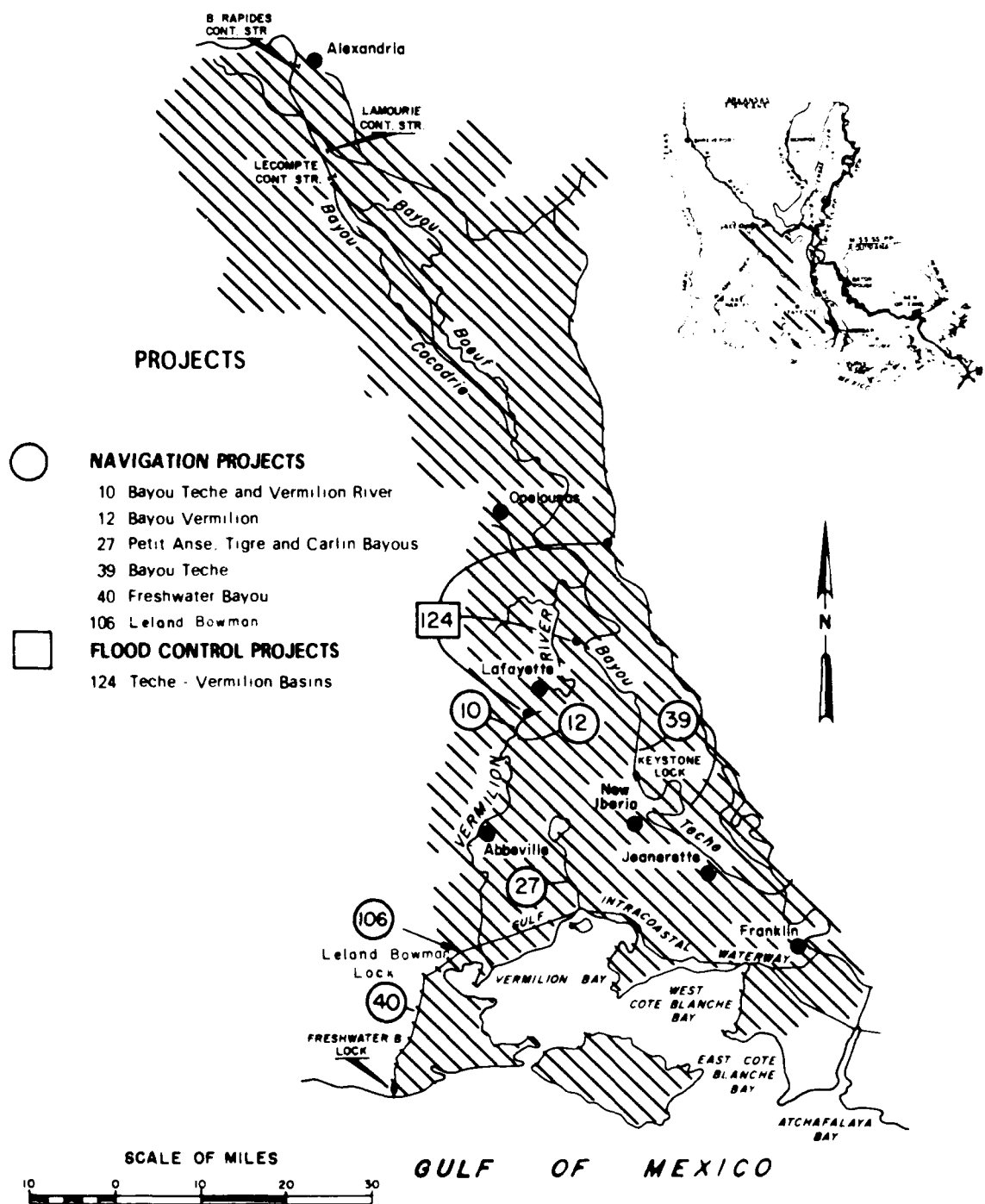
Introduction

This area comprises the drainage basins of Vermilion River and Bayou Teche. The upper portion of the area is composed of alluvial ridges along Bayou Teche, prairies, and hills. The lower portion consists primarily of coastal marshes. Navigation, flood control, municipal and industrial water supply, water-quality control, irrigation,

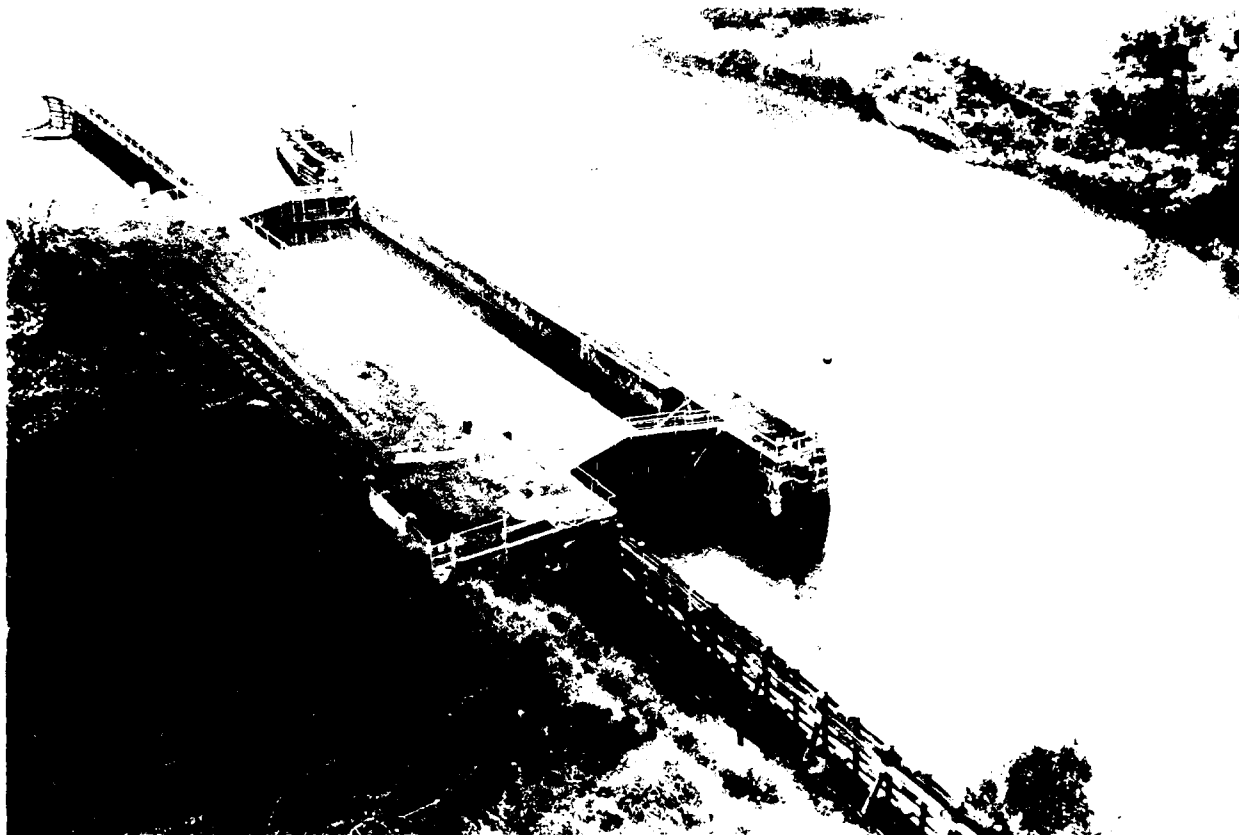
recreation, and fish and wildlife preservation and enhancement are the purposes served by Corps of Engineers projects in the Teche-Vermilion Basins. Individual improvements are described on the following pages.



Bayou Courtableau



Vermilion River and Bayou Teche Basins



Keystone Lock and Dam

Projects

Bayou Teche

(New Orleans District)

Authorized in 1934 and prior years, this project consists of a channel 8 feet deep and 80 feet wide, from the mouth of the stream to New Iberia; 6 feet deep and 60 feet wide to Keystone Lock; and 6 feet deep and 50 feet wide on the bottom to Arnaudville. It also includes a lock and dam.

The Keystone Lock and Dam was completed in 1913. All channel improvement work above Keystone Dam was completed in 1916. Channel improvement from the mouth to about 3 miles below New Iberia was completed in 1920.

An interim channel, 8 by 60 feet, was dredged along the 3-mile reach below New Iberia, and one 6 by 50 feet was dredged between New Iberia and Keystone Lock, a distance of approximately 17 miles.

The authorized project is about 71 percent complete. Cost of the existing project to date is \$754,330. The uncompleted portion of the work is inactive.

Average annual traffic on this waterway from 1979-1984 was 538,000 tons. The major cargoes include marine shells, crude petroleum, and sugar.

Bayou Teche and Vermilion River

(New Orleans District)

This multiple-purpose project, completed in March 1957 at a cost of \$2,891,922, provides improvements for navigation, flood control, and increased water supply for irrigation.

Specifically, the improvements consist of an 8- by 80-foot navigable channel from Vermillion Bay to the Gulf Intracoastal Waterway and a 9- by 100-foot channel from the Gulf Intracoastal Waterway to a fixed bridge located 400 feet south of the Southern Pacific Lines bridge at Lafayette. The act also authorized improvement of the nonnavigable channel of Vermilion River (also called Bayou Vermilion) and Bayou Fusilier from Lafayette to Bayou Teche, enlargement of Bayou Teche from about Mile 103.8 (2 miles below Arnaudville) to Port Barre (Mile 124.8), and raising the crest of Keystone Dam to permit increased diversion of water from Bayou Teche through Ruth Canal to the Vermilion River. As a result of the flood of March 1947, which occurred when flood control improvements on Vermilion River were substantially complete, the Vermilion was further enlarged between the Gulf Intracoastal Waterway and Youngs Cove.

Mile 17.5. Enlargement of the channel necessitated the construction of new highway bridges at Woodlawn and Milton and the modification of numerous other bridges.

The project waterways provide excellent recreational opportunities and are extensively used for boating, waterskiing, and fishing. Bayou Teche, an abandoned course of the Mississippi River, is particularly attractive. Its well-sloped banks, wide meander bends, stately moss-draped oaks, and historical heritage attract visitors from all parts of the country. Evangeline State Park and New Iberia City Park are located on the bayou and add to its recreational allure. The Vermilion River provides numerous boating facilities; among them are the Lafayette Boat Club, the Vermilion Boat Club, and several marinas in the vicinity of Intracoastal City. Planning is in progress to further develop recreation and boating access to Bayou Teche and Vermilion River.

Cumulative benefits from flood damages prevented through September 1986 are estimated at \$3,971,000. The average annual traffic from 1978-1984 was 921,376 tons. Crude petroleum, marine shells, and clay were the major cargoes.

Bayou Vermilion

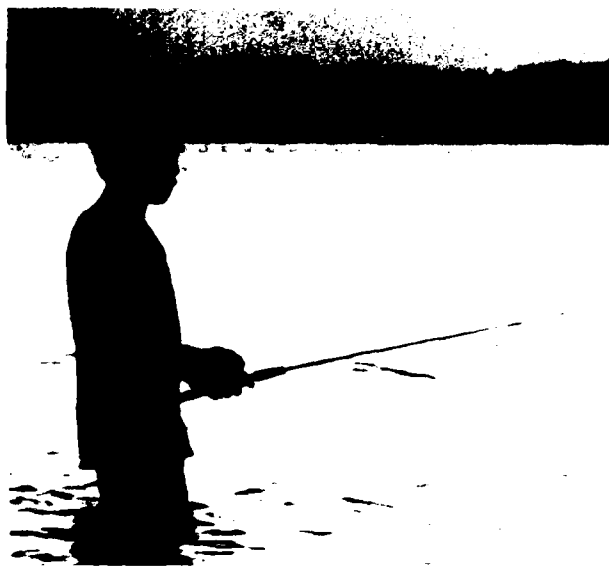
(New Orleans District)

This 51-foot channel from Vermilion Bay to Lafayette was completed in 1896 at a cost of \$34,900. The project has been superseded by the navigation features of the Bayou Teche and Vermilion River project described previously.

Freshwater Bayou

(New Orleans District)

Freshwater Bayou Channel and Lock gives access to petroleum, gas, salt, and sulphur resources in the Gulf. The project is also a useful route for fishermen and trappers.



One fisherman at dawn

Consisting of a 12- by 125-foot waterway between the Gulf Intracoastal Waterway in the vicinity of Vermilion River and the Gulf of Mexico, the waterway generally follows the existing channels of Schooner Bayou Cutoff, Schooner Bayou, Sixmile Canal, Belle Isle Canal, and Freshwater Bayou. An 84- by 600- by 16-foot lock constructed in the vicinity of Beet Ridge near the Gulf of Mexico prevents saltwater intrusion. Jetties to the 6-foot depth contour are authorized if justified by excessive maintenance of the offshore channel.

Cost of the existing project (except for construction of jetties at a later date, if necessary) was \$7,116,224 Federal and \$16,060 cash contributions. Estimated cost of construction of jetties (1971) is \$3,118,100. Estimated non-Federal cost for the existing project is \$171,000. In addition, the Coast Guard is to provide navigational aids at an estimated cost of \$19,100.

Channel excavation between the Gulf Intracoastal Waterway and the lock site was completed in 1965. The channel from the lock to the Gulf of Mexico was completed in 1967. The lock and channel were opened to navigation in 1968. The average annual traffic from 1979-1984 was 278,000 tons.

Petit Anse, Tigre, and Carlin Bayous

(New Orleans District)

These waterways are used for access to fishing and hunting areas, and boating and skiing are becoming more and more popular in the area. Average annual traffic on the project waterways from 1979-1984 was 1,382,000 tons.

Authorized in 1935, and modified in 1937, 1945, 1948, and 1960, the project currently provides for a 9- by 80-foot channel in Bayou Petit Anse from the Gulf Intracoastal Waterway to the north end of Avery Island, a 9- by 80-foot channel in Bayou Carlin from Bayou Petit Anse to Lake Peigneur, a harbor of refuge at Deleambre, Louisiana, and a 7- by 60-foot channel from the Gulf Intracoastal Waterway via McIlhenny Canal to deep water in Vermilion Bay. These improvements were completed in 1962 at a Federal cost of \$392,247. Mooring facilities have been constructed in the harbor of refuge by non-Federal interests.

This project was further modified in 1976 under authority of Section 201 of the Flood Control Act of 1965. Modifications authorized include enlargement of Bayou Petit Anse from the entrance of the Avery Island Salt Mine Canal to the Gulf Intracoastal Waterway to 12 by 125 feet, enlargement of Bayou Carlin from Bayou Petit Anse to Lake Peigneur to 12 by 125 feet, except within the town limits of Deleambre where the enlargement will be 12 by 80 feet, and replacement of the railroad bridge across Bayou Carlin at Deleambre with a vertical lift bridge to provide vertical clearance of 73 feet and horizontal clearance of 80 feet.

Pinhook Bridge

(New Orleans District)

Scour, caused by enlargement of the Vermilion River above and below the bridge, was threatening the

stability of the bridge approaches. Bank protection works, consisting of grading both banks and covering with riprap, were completed in 1950 at a cost of \$25,287.

Teche-Vermilion Basins (New Orleans District)

Authorized by the Flood Control Act of 1966, this feature provides for the diversion of supplemental fresh water from the Atchafalaya River upstream of Krotz Springs to the head of Bayou Teche, at Port Barre, Louisiana. The supplemental fresh water is to be distributed among Bayou Teche, Vermilion River, and the west side borrow pit along the WABPL for municipal, industrial, irrigation, and water quality control uses.

The initial improvements were constructed by the Federal Government at a Federal cost of \$35,700,000. The non-Federal cost was \$4,000,000. Construction improvements include a 1,300-cubic-feet-per-second pumping station at the Atchafalaya River, a leveed conveyance channel with an inverted siphon under State Canal, a control structure through the WABPL, and three downstream control structures: a gated culvert between Bayou Courtableau and the WABPL, borrow pit to the south, a weir in Bayou Fusilier, and a navigable gate in Icoreauville Canal.

The three new control structures and the existing non-Federal Ruth Canal Control Structure are to be operated to distribute the supplemental fresh water as needed. Operation and maintenance of the completed works is the responsibility of the Teche-Vermilion

Freshwater District. Construction was begun in 1976 and completed in 1982.

Leland Bowman Lock (New Orleans District)

The old Vermilion Lock is located in the Atchafalaya River-Sabine River section of the Gulf Intracoastal Waterway about 2 miles west of the Vermilion River. This lock was 1,182 feet long, 56 feet wide, with a depth over the sill of 11.3 feet below mean low Gulf datum. Because of its limitations of sill depth and width, the lock is a hindrance to navigation. In 1985, 38,922,318 tons of traffic passed through the lock.

A replacement of the old Vermilion lock was approved by the Secretary of the Army in May 1967, under authority contained in Section 6 of the River and Harbor Act of May 1909. The new lock, now called Leland Bowman Lock, is located just south of the existing waterway and west of the existing lock. It is 110 feet wide, 1,200 feet long, and has a depth over sill of 15 feet below mean low Gulf elevation.

Construction was initiated in September 1981, and the new lock was opened to traffic in March 1985. Estimated costs of the Leland Bowman Lock are \$32,200,000 Federal and \$240,000 non-Federal.

Eastern Rapides and South-Central Avoyelles Parishes

(New Orleans District)

Flooding and poor drainage are serious problems in the Chatlin Lake, Choctaw Bayou, and Bayou du Lac drainage areas, along the south bank of Red River



Leland Bowman Lock

southeast of Alexandria. The same problem exists, to a lesser extent, along Bayou des Glaives and the WABPL. About 206,000 acres in this area are subject to flooding.

In this primarily agricultural area, major crops include soybeans, cotton, and corn, while rice and sugarcane play a less important role. The Corps of Engineers and the U.S. Soil Conservation Service have coordinated their studies in an effort to develop flood control and drainage improvements that will result in the greatest benefits in the form of prevented flood damage and increased crop yield.

Authorized by the Flood Control Act of December 1970, the work to be done by the Corps consists of:

- enlargement of the existing channels of Chatlin Lake Canal, Bayou du Lac, Bayou des Glaives, with a new land cut to the Bayou des Glaives Diversion Channel, and the WABPL borrow pit to the vicinity of U.S. Highway 190;
- diversion of these flows to the Atchafalaya Basin by construction of a structure in the WABPL;
- an outlet channel into the Atchafalaya Basin;
- a control structure in the borrow pit;
- a levee south of the other structure to assist in diverting floodflows along the west side of the enlarged WABPL borrow pit from U.S. Highway 190 to the vicinity of Palmetto;

- rectification of drainage intercepted by excavated material bank levees; and
- Federal acquisition of the Lake Pearl area.

Several features of this project will help maintain and enhance existing fish and wildlife and recreational use within the area. An overflow weir will be constructed at the eastern edge of Lake Pearl to maintain existing low-water conditions for commercial crawfish production. The lake will then be turned over to the Louisiana Wild Life and Fisheries Commission for management. Other features of the project will include such improvements as weirs to maintain fish and wildlife production and a boat-launching facility and access channel to maintain existing sport and commercial fishing.

Cost of Corps of Engineers work (1986) is estimated at \$66,700,000 and non-Federal cost at \$16,700,000. The project was classified as inactive in 1987 when it was determined that it was no longer economically justified.

Small Projects

Snagging and clearing of 6.9 miles of Bayou des Cypraires in 1953, at a cost of \$42,498, were accomplished under the authority of Section 2 of the Flood Control Act of 1937, and subsequent modifications.

Programs and Surveys

Flood Plain Information Reports

Franklin (New Orleans District). A flood plain information report on the Franklin area, initiated in 1976, has been suspended and, in lieu thereof, a flood insurance study for the city of Franklin has been initiated.

Lafayette (New Orleans District). A flood plain information report on the Lafayette area was completed and published in 1973, at a cost of \$45,722.

The study area encompassed drainage from Vermilion River and tributaries, beginning along Vermilion River at Mile 42 and continuing upstream to Mile 63. Most of the flooding in the area is due to headwater flooding, although high stages in the Vermilion River can cause backwater flooding.

Scott and Lafayette Parish (New Orleans District). A flood plain information report on the Scott area was completed and published in 1974 at a cost of \$40,000.

The study included the drainage area of Coulee Ile des Cannes and tributaries, beginning with Coulee Ile des Cannes at its confluence with Vermilion River and continuing upstream to Mile 16. The report indicated that the area is subject to headwater and backwater flooding.

Flood Insurance Studies

Under the National Flood Insurance Act of 1968 (PL

90-448) and Flood Disaster Protection Act of 1973 (PL 93-234), the Corps of Engineers, upon request of HUD, conducted flood insurance studies. The Federal Emergency Management Agency (FEMA) now has that responsibility. Insurance studies that have been completed in the Vermilion River and Bayou Teche Basins are: Abbeville, Baldwin, Franklin, Lafayette, Lafayette Parish, Marksville, Scott, Duson, and St. Mary Parish.

Surveys Authorized Or Under Way

Bayous Rapides, Boeuf, and Cocodrie and Outlets (New Orleans District). The study is investigating the advisability of additional improvements for flood control, drainage, and related purposes. Measures under consideration include modifications, extensions, or additions to existing flood control features. This study has been suspended, pending completion of postauthorization studies on the Bayou Cocodrie and Tributaries project and Eastern Rapides and South-Central Avoyelles Parishes project. These projects will have a significant impact on flood control and drainage in the project area.

Bayou Sale Ridge (New Orleans District). This study is to determine the advisability of modifying Bayou Sale from the Gulf Intracoastal Waterway to the Gulf of Mexico to improve flood control, drainage, and hurricane protection. The study has not been funded.

Mermentau River Basin

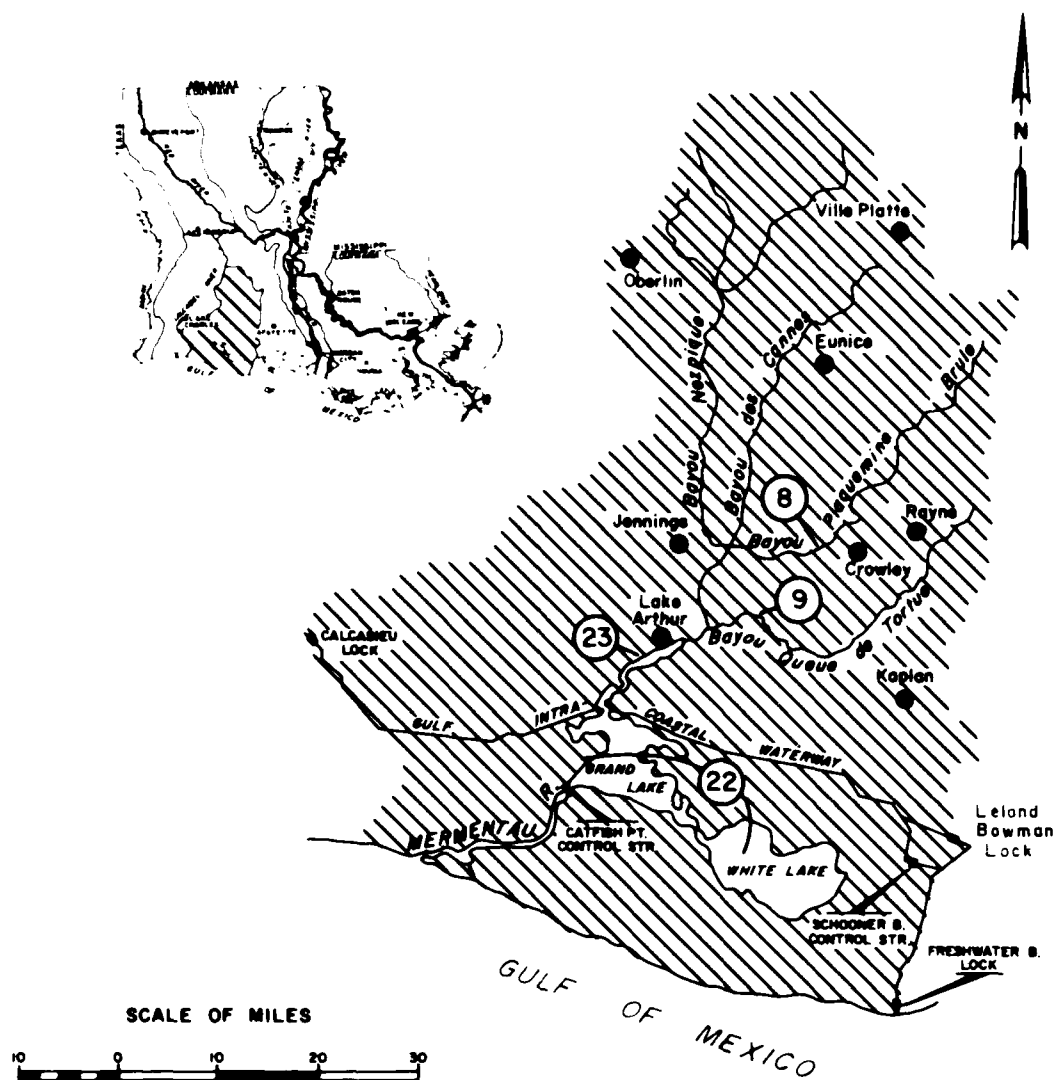
Introduction

This basin, located between the Teche-Vermilion and Calcasieu Basins, comprises a controlled system for the drainage of Mermentau River and its tributaries. Four structures, Catfish Point Control Structure, Schooner Bayou Control Structure, Calcasieu Lock, and Leland Bowman Lock, control the impoundment of winter

runoff for irrigation use in the summertime. The upper portion of the basin consists of hills and prairies, and the lower portion consists primarily of coastal marshes. Corps of Engineers projects in the basin, primarily navigation improvements, are described on the following pages.



Trawling for shrimp



PROJECTS



NAVIGATION PROJECTS

- 8 Bayou Plaquemine Brule'
- 9 Bayou Queue de Tortue
- 22 Inland Waterway from Franklin to the Mermentau River
- 22 Mermentau River
- 22 Waterway from White Lake to Pecan Island
- 23 Mermentau River, and Bayous Nezpieque and Des Cannes

Mermentau River Basin



Fishing boats

Projects

Bayou Plaquemine Brule' (New Orleans District)

The project provides for a channel 6 feet deep and 60 feet wide from the mouth to a point near Crowley, a distance of about 19 miles. It was completed in 1915 at a cost of \$33,410. In recent years the State of Louisiana has cleared the bayou of snags and overhanging trees and straightened the channel for flood control. Average annual traffic for the period 1978-1984 was 8,147 tons. Principal cargo on this waterway is crude petroleum.

Bayou Queue de Tortue (New Orleans District)

No channel dimensions are specified in this 14-mile channel project, which provides for the removal of obstructions from the mouth of Bayou Queue de Tortue to the Southern Pacific Lines bridge, at Riceville, and the dredging of 10 cutoffs. The project was completed in 1923 at a cost of \$33,355. Maintenance, clearing, and snagging were begun in 1969. The controlling depth will be 5 feet mean low Gulf for the full project length. The average annual traffic over the waterway, 1952-1955, was 2,900 tons. No commerce has been reported since 1955.

Inland Waterway from Franklin to the Mermentau River (New Orleans District)

Completed in 1924, this waterway provides a 5- by 40-foot channel from Bayou Teche near Franklin through

Hanson Canal, Bayou Portage, the Intracoastal Canal, Schooner Bayou Cutoff, Schooner Bayou, and a new land cut to White Lake. The channel then goes through White, Turtle, Alligator, and Collicon Lakes and connecting channels, and finally through Grand Lake to the Mermentau River at the northern entrance to the lake. Total cost of construction was \$249,100.

This project has been largely superseded by the "Intracoastal Waterway" project. The part of the project west of Vermilion River was incorporated into the "Mermentau River" project by the River and Harbor Act of 1946. Under authority of PL 85-837, the Hanson Canal and Lock were transferred to the Police Jury of St. Mary Parish in 1959.

Average annual traffic on the waterway, 1959-1963, was 591,000 tons. Traffic since 1964 is included in the Mermentau River total.

Mermentau River (New Orleans District)

Work authorized under this project includes:

- Channel improvement of the Mermentau River below Grand Lake and existing channels between Grand and White Lakes and White Lake and Vermilion Bay to provide channels with areas of 3,000 square feet below mean low Gulf level for floodflows.
- The construction of control structures in the enlarged channels near Grand Lake (at Catfish



Mermentau River, Gulf of Mexico
Navigation Channel

Point) and Schooner Bayou to prevent saltwater intrusion into the Mermentau Basin.

- The enlargement of Schooner Bayou Cutoff and North Prong of Schooner Bayou to provide 6- by 60-foot channels for navigation.
- The incorporation of the completed project, "Waterway from White Lake to Pecan Island," and that part of the completed project "Inland Waterway from Franklin to the Mermentau River," west of the Vermilion River.

This project was completed in 1952 at a cost of \$4,631,910.

The Catfish Point Control Structure has three sets of gates, each set having a width of 56 feet. The sill elevations of two sets are at 15 feet below mean low Gulf level; the other set is 10 feet below mean low Gulf level. The Calcasieu and Leland Bowman Locks were completed in 1950 and 1985, respectively, under the navigation project, "Gulf Intracoastal Waterway Between Apalachee Bay, Florida, and the Mexican Border." These locks were constructed to prevent saltwater intrusion into the Mermentau Basin through the Intracoastal Waterway. They are operated in conjunction with the Schooner Bayou and Catfish Point Control Structures for regulation of the water levels in Grand and White Lakes. The gates of Schooner Bayou Lock, a feature of the incorporated portion of the "Inland Waterway from Franklin to the Mermentau River," project, were permanently closed, and traffic was routed through the control structure in 1951.

The cumulative benefits through September, 1986 for flood damages prevented are \$1,716,000. The average annual traffic on the Mermentau River from 1978-1984 was 958,196.

Mermentau River, and Bayous Nezpique and Des Cannes

(New Orleans District)

This project consists of removal of obstructions to navigation in the natural channel of the Mermentau River from its head (at the junction of Bayous Nezpique and Des Cannes) to the Gulf, a distance of about 71.5 miles, in Bayou Nezpique for the lower 25 miles, and in Bayou Des Cannes from its mouth to the Evangeline Bridge, a distance of about 8.5 miles. The project also calls for improvement of the channel in lower Mud Lake by dredging and by construction of a brush dam to concentrate the action of the current, removal of a portion of the wrecked dam at Mile 7, and a channel 9 feet deep at mean low Gulf level and 100 feet wide from the Intracoastal Waterway to the junction of Bayous Nezpique and Des Cannes.

The project was completed in 1935 at a cost of \$58,000. Average annual traffic along this project, 1978-1984, was 1,362,000 tons.

Boating and skiing are popular activities along these waterways. Facilities are maintained by the boat clubs of Jennings, Crowley, Eunice, and Lake Arthur. Preliminary plans for additional access and recreation facilities, such as boat-launching ramps and picnicking areas, have been completed and approved. Local cooperation is required for the implementation of these plans.

That part of the project in the lower Mermentau River below Grand Lake has been superseded by the project, "Mermentau River," described previously. A modification of the project, authorized under the River and Harbor Act of 1965, provides for:

- The enlargement and realignment of Bayous Nezpique and Des Cannes to obtain a 12- by 125-foot channel from Interstate Highway 10 to the Mermentau River.
- The realignment of the Mermentau River upstream of the Gulf Intracoastal Waterway by the construction of several cutoffs, each 12 by 125 feet.
- The enlargement of the channel through Lake Arthur to 12 by 200 feet.
- The replacement of the highway bridge at the town of Lake Arthur with a new structure having a vertical clearance of 50 feet and a horizontal clearance of about 200 feet.

The first contract was awarded in 1974 at a cost of \$279,000, for the construction of four cutoffs. During construction, archeological sites were discovered at two of the four cutoffs locations. Because of the value of these archeological sites, the Corps of Engineers altered the sequence of construction of the cutoffs and established a salvage program for the two cutoffs. Work on the first contract was completed in 1974. Work on the next three cutoffs (Mile 61.85 to 64.85) was started in 1976 and completed in 1977, at a cost of \$456,000. This completes all work on the Mermentau River from Louisiana Highway 14 to U.S. Highway 90. No construction has been initiated on the remaining

portions of the project, which have been reclassified into the inactive category based on a 1981 economic reanalysis. Estimated cost of the project modification, (1976), was \$7,156,000 Federal, including \$51,000 for navigation aids and \$1,125,000 non-Federal.

A reimbursable contract for replacement of the highway bridge at Lake Arthur was signed by the Louisiana Department of Highways and the Corps of Engineers in 1971. Bids for construction of the bridge were received by the Highway Department in 1972. The cost of the bridge was \$4,719,000, of which \$3,912,000 is Federal cost. Work has been completed, and the bridge was opened to traffic in 1975.

Waterway from White Lake to Pecan Island (New Orleans District)

Authorized in 1937 and partially completed in 1939 at a cost of \$10,900, this 1.8-mile project provides for a 5-by-40-foot channel from deep water in White Lake to

Pecan Island. The project was reoperated in 1970 as "Mermentau River" project by the Rivers and Harbors Act of 1946.

Average annual traffic, 1989-1993, was 28,600 tons. Traffic is now included in the Mermentau River project.

Mermentau River, Gulf of Mexico **Navigation Channel** (New Orleans District)

The Mermentau River, Gulf of Mexico Navigation Channel was constructed in 1971 by the East Cameron Port, Harbor, and Terminal District of Cameron Parish. This 4.6-mile channel begins at the point of entry of Mermentau River into Lower Mud Lake and extends in a southerly direction to the Gulf of Mexico. Federal assumption of maintenance of this channel was authorized by Congress on October 22, 1976, under the Water Resources Development Act of 1976 (Public Law 94-587).

Programs and Surveys

Flood Plain Information Reports

Church Point (New Orleans District). A flood plain information report on the Church Point area was completed and published in 1972 at a cost of \$29,784.

The study area is limited to Bayou Plaquemine Brule' in the vicinity of Church Point from Mile 37 to 44.5. The report provides information on the nature of flood problems, the flooding in the Church Point area, and the location of areas subject to possible future floods. The report serves as a basis for the adoption of land-use controls to guide flood plain development.

Crowley (New Orleans District). A flood plain information report on the Crowley area was completed in 1974 at a cost of \$35,000.

The study area comprises Bayou Plaquemine Brule' and tributaries from Mile 11.2 along Bayou Plaquemine Brule' upstream to Mile 20. The report indicates that the area is subject to headwater and backwater flooding.

Flood Insurance Studies

Under the National Flood Insurance Act of 1968 (PL 90-448) and Flood Disaster Protection Act of 1973 (PL 93-234), the Corps of Engineers, upon the request of HUD, conducted flood insurance studies. The Federal Emergency Management Agency (FEMA) now has that responsibility. An insurance study that has been completed in the Mermentau River Basin is Lake Arthur, Louisiana.

Surveys Authorized Or Under Way

Mermentau, Vermilion, and Calcasieu Rivers, and Bayou Teche (New Orleans District). This study is investigating the advisability of improvements or

modifications to existing improvements in the interest of flood control, major drainage, navigation, water supply, water-quality control, saltwater intrusion, recreation, fish and wildlife, and other related water and land resources. An interim report recommending Federal assumption of the maintenance of the Mermentau River-Gulf of Mexico Navigation Channel was completed in 1975. This assumption of maintenance was authorized by the Water Resource Development Act of 1976.

An interim study investigating the feasibility of providing navigation improvements between the Port of Iberia and the Gulf of Mexico was terminated in 1981. The Lake Charles Flood Control interim study has been placed in the inactive category following submission of a negative report in July 1984. The Lake Charles Ship Channel study was conducted under this authorization but was recommended for construction under the Small Projects program in 1987.

Two other interim studies are currently under way. The Grand and White Lakes study is a multipurpose study in which improvements in water management to benefit agriculture, navigation, flood control and commercial fisheries are being examined. This interim report is scheduled for completion in 1991. The Upper Bayou Teche study was initiated in 1985 with 100 percent non-Federal funding contributed by the Teche-Vermilion Fresh Water District. The purpose of this study is to determine the feasibility of increasing low flows in Bayou Teche and the Vermilion River to benefit commercial fisheries (crawfish) and to provide an agricultural water supply of sufficient quantity and quality. This interim report is scheduled for completion in 1989. The overall study is scheduled for completion in 1993.

Calcasieu River Basin

Introduction

The Calcasieu is a small river in southwestern Louisiana that runs nearly parallel to the Mississippi. The river's 3,500-square-mile basin is composed of hills and prairies in the upper portion and coastal marshes along the lower portion.

Rich oil and gas fields lie within the 100-mile curve of the upper river. Rice lands surround the city of Lake Charles, which is 34 miles from the Gulf, just south of the point where the West Fork enters the mainstream of the Calcasieu.

In 1941, a program of improvement was begun by the Corps of Engineers to make the Calcasieu useful for commerce. The Corps dredged a 40- by 400-foot

channel from old Highway 90 at Lake Charles to the Gulf, where existing jetties were enlarged and straightened. An approach channel from the Gulf of Mexico was opened to provide access to deep water. Further provisions were made for a mooring and turning basin, a ship channel to Cameron, and a saltwater guard lock at the intersection of the river and the Intracoastal Waterway.

The primary project feature in the Calcasieu River Basin, the Calcasieu saltwater barrier, was constructed to prevent saltwater intrusion in the Calcasieu River above Lake Charles. The various basin projects are described on the following pages.



Calcasieu Lock

Projects

Bayou Choupique

(New Orleans District)

Improvements consist of 2.7 miles of channel enlargement, 2.5 miles of diversion channel between the Gulf Intracoastal Waterway and Mile 7.5, and the construction of an automatic drainage gate in the diversion channel near its mouth to prevent saltwater intrusion into the bayou through the diversion channel.

This work was completed in 1954 at a cost of \$129,930. Cumulative benefits from flood damage prevented through September 1983 are estimated at \$576,000.

Calcasieu River and Pass

(New Orleans District)

This improvement consists of:

- enlargement of the previous 35-foot ship channel to provide an approach channel 42 feet deep and 800 feet wide in the Gulf of Mexico;
- construction of a channel 40 feet deep and 400 feet wide extending from the jetties at the mouth of the river to Lake Charles (Mile 34.3);
- enlargement of the existing turning basin at Mile 29.6 to a depth of 40 feet;
- construction of a mooring basin at Mile 3;
- extension of the existing ship channel (35 by 250 feet) upstream to U.S. Highway 90 (Mile 36.0), with a turning basin at the upper end; and
- maintenance of the existing 12- by 200-foot channel

in the old bends of Calcasieu River in Cameron.

The 35-foot project was completed in 1953 at a total cost of about \$7,800,000. The 40-foot modification was completed in 1968 at a cost of about \$19,600,000, exclusive of \$427,000 to the U.S. Coast Guard for navigation aids.

Marsh has been and will continue to be created with maintenance material from this project.

Average annual traffic over the waterway from 1978-1984 was 22,306,000 tons, with crude petroleum, petroleum products, and chemicals accounting for the major portion of cargo. Below Lake Charles, the river serves primarily as access to fishing and hunting areas in adjacent lakes, bayous, marshes, and the Gulf of Mexico.

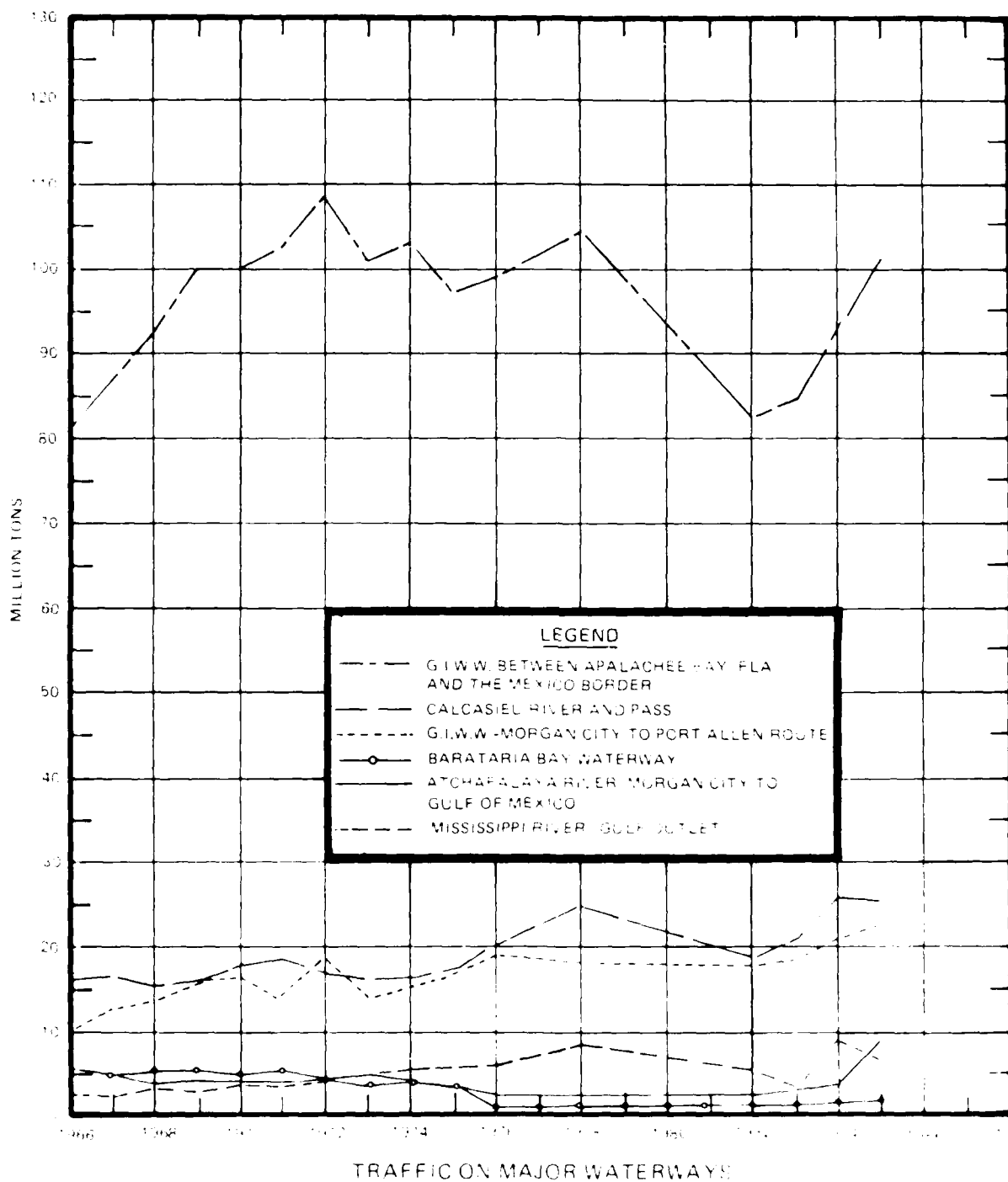
Above Lake Charles, the Calcasieu River provides excellent fishing and hunting. Private camps, picnic areas, and commercial recreational facilities are available from Phillips Bluff to Lake Charles.

Calcasieu River and Pass Saltwater Barrier (New Orleans District). A modification of the Calcasieu River and Pass project described previously was authorized by the River and Harbor Act of 1962. It called for construction of a barrier to prevent saltwater intrusion in the river above Lake Charles.

The project consists of a tainter gate structure in a new channel excavated across the narrow neck of land between Mile 38.6 and 43.5, an earth dam in the old channel at Mile 43.2, and bank revetment along the left



Calcasieu Saltwater Barrier



TRAFFIC ON MAJOR WATERWAYS

bank of the existing channel between Mile 43.6 and 44.2 and along the left bank opposite the downstream end of the structure. A navigation channel with a gated structure 56 feet wide and sills 13 feet below mean low Gulf level is located north of the new barrier channel.

Construction of the barrier was initiated in 1965 and completed in 1968 at a cost of \$4,197,262.

Calcasieu River at Devil's Elbow (New Orleans District). Authorized in 1970 under the provisions of Section 201 of the Flood Control Act of 1965, this project consists of enlargement and extension of an existing ship channel into an industrial park being developed by the Lake Charles Harbor and Terminal District. Over \$5 million has been spent by the Harbor and Terminal District for acquisition of 800 acres of land, a railroad spur, and for construction of a 35-foot-deep spur channel connecting with the Calcasieu River ship channel.

The enlarged channel matches the Calcasieu River ship channel dimensions of 40 by 400 feet. A 1,200-by-1,400-foot turning basin was built at the landward end of the channel.

Federal cost of the project was \$5,668,000, including \$68,000 for the navigation aids. Non-Federal costs were \$798,000. Detailed planning was initiated in 1972 and construction was begun in 1976. The project was completed in 1978.

Calcasieu River at Coon Island
(New Orleans District)

Authorized by Section 107 of the River and Harbor Act of 1960, as amended, the project provides for construction of a 40- by 200-foot ship channel and a 40- by 750- by 100-foot turning basin in Coon Island

Channel. The Coon Island ship channel begins at its confluence with Calcasieu River and Pass ship channel and terminates opposite the northern end of Coon Island, a distance of 7,467 feet. Construction was initiated in 1973 and completed in 1974 at a Federal cost of \$975,000, including \$25,000 for navigation aids; non-Federal costs were \$613,000.

Lake Charles Deepwater Channel
(New Orleans District)

This project originally provided for Federal maintenance of the 30- by 125-foot channel constructed by local interests between the Calcasieu and Sabine Rivers, a distance of approximately 24.9 miles. However, the project is now inactive, since direct access from Lake Charles to the Gulf was provided by the "Calcasieu River and Pass Project," described previously.

This project coincides for its entire length with the Gulf Intracoastal Waterway, under which maintenance to a 12-foot depth is accomplished as necessary.

All traffic over this waterway is barge traffic associated with the Gulf Intracoastal Waterway. Average annual traffic for the 1978-1984 period was 34,597,000 tons.

Small Projects

Lake Charles Ship Channel (New Orleans District). This study recommended realigning the restrictive bendway at mile 26.7 of the Calcasieu River. Channel enlargements ranging from 45 to 55 feet and a passing lane holding area were also considered but were not economically justified. *The report is being prepared for transmittal to higher authority.*

Programs

Flood Plain Information Reports

Oakdale (New Orleans District). A flood plain information report on the Oakdale area was completed and published in 1968 at a cost of \$25,803.

The study area is limited to Calcasieu River in the vicinity of Oakdale, between approximately Mile 127, above the mouth, and Mile 135. The study indicates that Oakdale is subject to headwater flooding from Calcasieu River. At the time the study was completed, no flood damage prevention measures had been taken in the study area or upstream in the watershed, nor were any authorized or proposed.

DeQuincy (New Orleans District). A flood plain information report on the DeQuincy area was completed and published in 1972 at a cost of \$25,771.

The study area comprises Buxton Creek and tributaries from Buxton Creek at Mile 12.0 upstream to Mile 12.5. The study area is subject to headwater flooding.

Flood Insurance Studies

Under the National Flood Insurance Act of 1968 (PI 90-448) and Flood Disaster Protection Act of 1973 (PI 93-234), the Corps of Engineers conducted flood insurance studies for HUD. The Federal Emergency Management Agency (FEMA) now has that responsibility. Insurance studies that have been completed in the Calcasieu River Basin are: Calcasieu Parish (unincorporated areas), Lake Charles, and DeQuincy.

Sabine River Basin

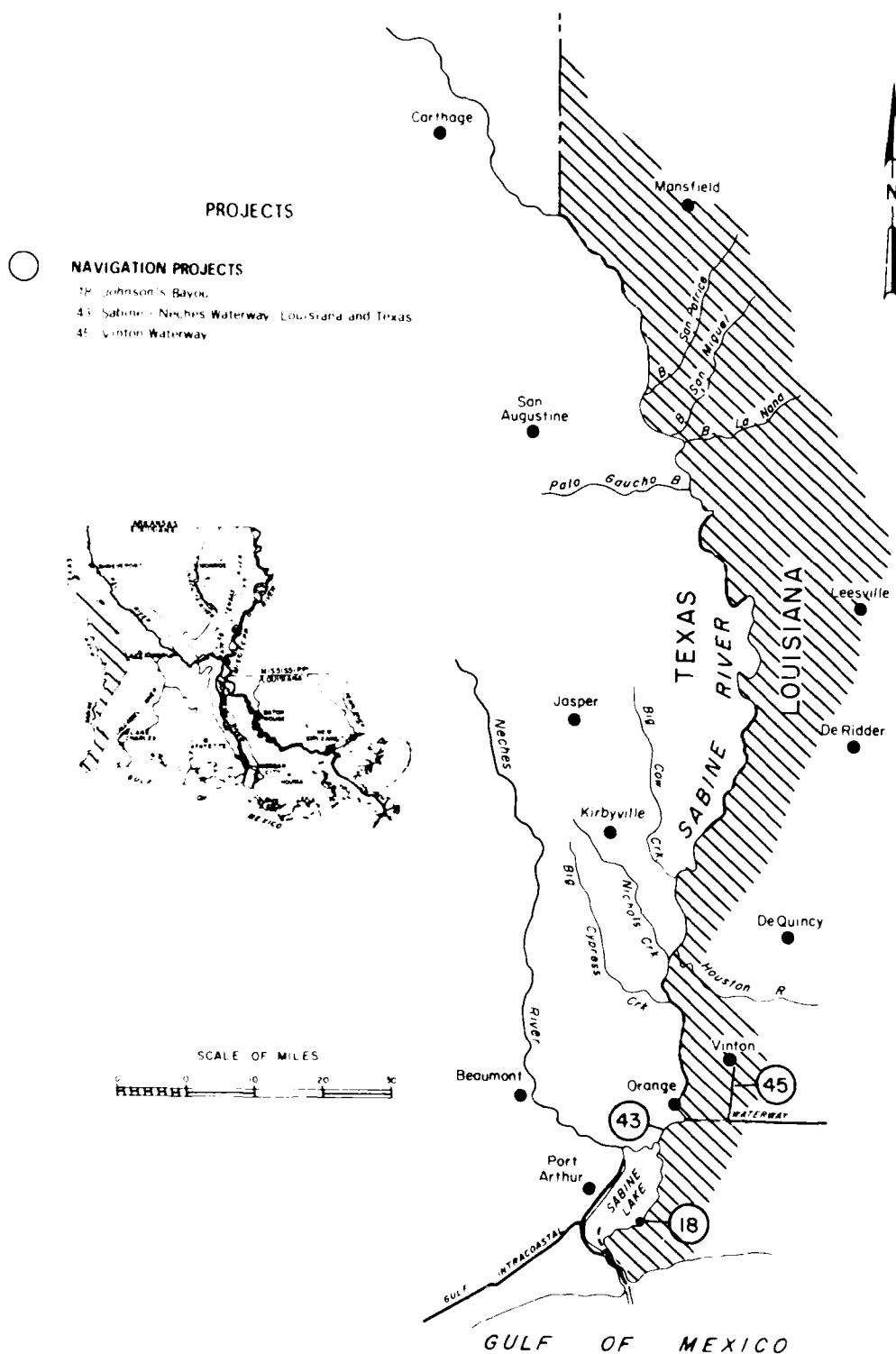
Introduction

This basin, in the western part of the Louisiana, is bounded by the State of Texas on the west and Calcasieu River Basin on the east. The basin encompasses all the drainage area of the Sabine River

in Louisiana. The three completed Corps of Engineers' navigation projects in Sabine River are described subsequently.



Cutter head dredge in Sabine River Outlet



Sabine River Basin

Projects

Johnson's Bayou (Galveston District)

This 6-foot-deep, 0.5-mile-long channel improvement of unspecified width, from Johnson's Bayou through the bar in Sabine Lake, was completed in 1899 at a cost of \$2,262. The project is in the inactive category for maintenance. Average annual commerce on the waterway, 1979-1984, was 402,736 tons.

Sabine-Neches Waterway, Louisiana and Texas (Galveston District)

Authorized in 1921, this project consists of the construction and maintenance of 85.0 miles of deep water from the Gulf of Mexico, through a jettied entrance at the mouth of Sabine Pass, to the cities of Port Arthur, Beaumont, and Orange, Texas, via the Port Arthur Canal, Sabine-Neches Canal, and the Neches and Sabine Rivers.

Only that part of the improvement in Sabine River between Orange and Sabine Lake and Sabine Lake and the Gulf is in Louisiana. The Sabine River portion of the Sabine-Neches deep-draft waterway project extends from the mouth of the Sabine River at the north end of Sabine Lake through the Sabine River to Orange, a distance of 12 miles.

The existing authorized project provides for:

- a channel 30 feet deep and 200 feet wide from the mouth of the Sabine River to the foot of Green Avenue at Orange, and a 25-foot-deep and 150-foot-wide channel around around Harbor Island.
- a maneuvering area at the entrance to the Orange Municipal Slip.

The Water Resources Development Act of 1986 authorized the Corps of Engineers to carry out



Beachfront property



Sabine River outlet, Galveston District

planning, engineering, and design for a project to extend the channel at a depth of 30 feet and a width of 200 feet, from its present upstream terminus opposite Green Avenue in Orange, Texas, generally following the present river alignment, a distance of approximately one and one-quarter miles to a point opposite Little Cypress Bayou. Average traffic in the Sabine-Neches Waterway, 1978-1984, totaled 93,448 tons.

Vinton Waterway
(New Orleans District)

A 9-foot-deep and 60-foot-wide waterway from the Gulf Intracoastal Waterway via the Vinton Drainage

Canal to a turning basin at Vinton was authorized by the River and Harbor Act of 26 August 1937. Local interests have been unwilling to provide the necessary rights-of-way and excavated material disposal areas. No work has been performed to date. This project was reviewed under the Deauthorization Review Program and was subsequently deauthorized on 2 November 1979. No commerce reported.

Coastalwide Projects

Introduction

Corps of Engineers improvements that traverse several basins are included in this section. The primary feature is the Gulf Intracoastal Waterway, which extends

across the entire length of the lower portion of the state. Individual improvements are described below

Projects

Gulf Intracoastal Waterway Between Apalachee Bay, Fla., and the Mexican Border (New Orleans District)

A series of Congressional Acts has authorized work which has progressively extended and enlarged the navigable channel to afford a practical coastal waterway route along the Gulf coast. Through the interconnection with the Mississippi River System and other important inland waterways, the Intracoastal Waterway enables small craft and commercial tows to

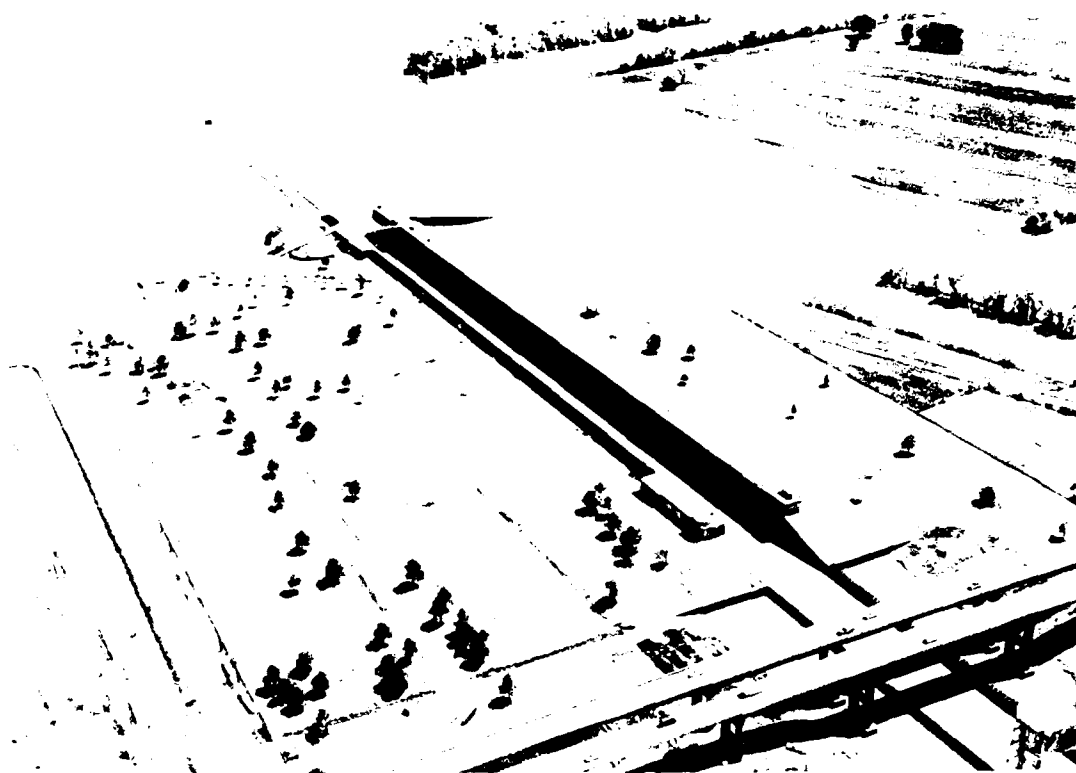
reach many points throughout the eastern and southern seaboard, the Midwest, and the Great Lakes areas.

The description herewith will be limited to that part of the project located in the State of Louisiana. (For description of the remainder of the project, see similar booklets prepared for the States of Florida, Alabama, Mississippi, and Texas.)

The Intracoastal Waterway within Louisiana extends along the coast of the Gulf of Mexico from Lake Borgne Light No. 29, the eastern boundary, to the



Gulf Intracoastal Waterway



Port Allen Lock (at Baton Rouge)

Sabine River, the western boundary, a distance of 302 miles, from Port Allen to Morgan City, a distance of 64 miles, from Plaquemine to Indian Village, a distance of 7.4 miles, and to the town of Franklin via the Franklin Canal, a distance of 5.15 miles.

The project, as authorized by the River and Harbor Act of March 1925 and subsequent modifications through the River and Harbor Act of July 1946, provides for the following channel dimensions in the State of Louisiana:

- Main routes: 12 by 150 feet from Lake Borgne Light No. 29 to the Industrial Canal, and 12 by 125 feet from the Mississippi River to the Sabine River,

including the routes through both Algiers and Harvey Locks.

- Alternate routes: 12 by 125 feet from Morgan City to the Mississippi River at Port Allen, and 9 by 100 feet from Plaquemine to Indian Village on the Morgan City-Port Allen Route.
- Franklin Canal: 8 by 60 feet from its confluence with the Gulf Intracoastal Waterway to Franklin.

At present there are nine locks in operation on the waterway routes. Dimensions of these locks are shown in the following tabulation.

<i>Locks</i>	<i>Size, feet</i>		<i>Cost</i>	<i>Elevation of Sill*</i>	<i>Opened to Navigation</i>
	<i>Width</i>	<i>Length</i>			
Berwick	45	300	\$ 2,100,000	9.0	1951
Inner Harbor Navigation Canal	74	626	8,648,492	31.5	1923
Harvey	75	415	1,775,132	12.0	1934
Leland Bowman	110	1,200	32,200,000	15.0	1985
Calcasieu	75	1,194	2,133,527	13.0	1950
Algiers	75	760	5,215,700	13.0	1956
Bayou Sorrel**	56	790	4,700,948	14.0	1951
Bayou Boeuf**	75	1,148	2,754,000	13.0	1954
Port Allen	84	1,188	13,902,222	13.75	1961

* Mean low Gulf level, feet

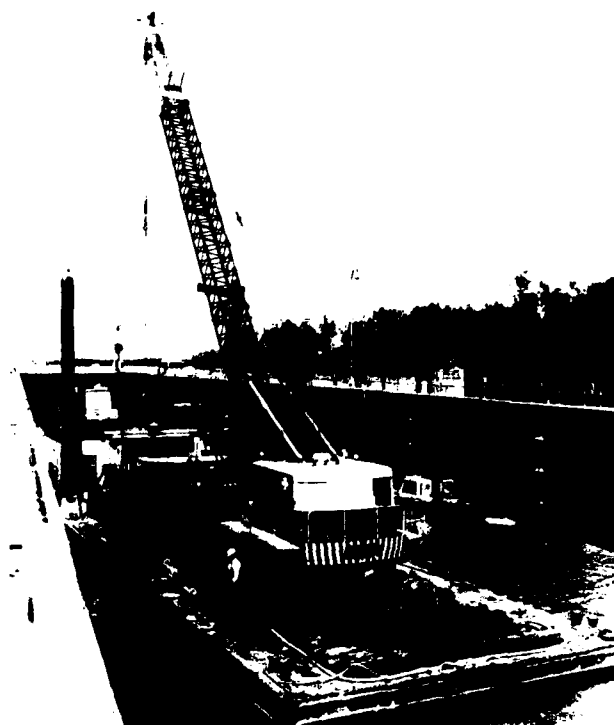
** Constructed and operated under the project, "Flood Control, Mississippi River and Tributaries."

The Berwick Lock was constructed to provide a navigation passage up the Lower Atchafalaya River to Patterson, Louisiana, and to Bayou Teche. The lock is described under the Atchafalaya River Basin.

The Calcasieu and Leland Bowman Locks were constructed and are operated to prevent saltwater intrusion into the Mermentau River Basin. These locks are an essential part of the plan of improvement for the Mermentau River project.

The Algiers Lock and Canal route begins 6 miles west of Harvey Lock on the existing waterway and extends to the Mississippi River below Algiers. The 9-mile channel and lock were completed in 1962 but have been open to navigation since 1956. Average annual traffic through Algiers Lock, 1977-1981, was 23,726,000 tons. Federal cost of the project route was \$15,896,000, and non-Federal was \$2,185,000.

The 64.1-mile-long alternate route from Morgan City to the Mississippi River, a new lock at Port Allen, and the channel in Bayou Plaquemine from Indian Village to the inoperative lock at Plaquemine were begun in 1955 and completed in 1962. The Port Allen Lock was opened to navigation in July 1961. In September 1961, the Plaquemine Lock on the channel from Indian Village to the Mississippi River was permanently closed. New bridges were constructed for the Texas and Pacific Railway crossing at Morley and Port Allen and for the Louisiana State Highway I crossing at Port Allen. Local interests constructed a highway bridge at Indian Village. Average annual traffic on the Morgan City-Port Allen Route, 1977-1981, was 18,785,724 tons.



Algiers Lock

This modification was completed in 1963 at a Federal cost of \$26,869,000 and non-Federal cost of \$2,250,000.

The bridge over the waterway, authorized at Paris Road in New Orleans, has been superseded by the larger bridge, required at the same location for the Mississippi River-Gulf Outlet, now completed.

An interim section of 8 by 50 feet was completed for the Franklin Canal in 1950 by the Federal Government. The canal was enlarged to project dimensions (8 by 60 feet) by local interests in 1953-1954.

All other work authorized through 1946 for this project, except bulkheads and jetties at Lake Borgne and Chef Menteur, has been completed. The bulkheads and jetties were no longer considered necessary. This project feature was reviewed under the Deauthorization Review Program and was subsequently deauthorized on 2 November 1979. Total cost of the new work in Louisiana under the existing project is \$62,402,000, including \$72,000 for navigation aids and \$14,830,000 non-Federal.

The average annual traffic, 1981-1985, on the waterway between Apalachee Bay and the Mexican border was 364,375,000 tons.

The enlargement of the main channel west of the Mississippi River with a bypass south of Houma was authorized by the River and Harbor Act of October 1962.

Modification of the "Gulf Intracoastal Waterway Between Apalachee Bay, Florida, and the Mexican Border," authorized by the River and Harbor Act of 1962, consists of enlargement and realignment of the existing 12- by 125-foot channel between the Mississippi River at New Orleans and the Houston Ship Channel. The modification includes the following new channels in Louisiana:

- A channel 16 feet deep and 150 feet wide between Mile 5 of the Harvey Canal west of Harvey Lock and the Atchafalaya River.
- A channel 16 feet deep and 150 feet wide in the Algiers alternate canal.
- A bypass channel 16 feet deep and 150 feet wide south of Houma, with 58 percent of the cost of four bridges to be borne by the Federal Government.
- A channel 16 feet deep and 200 feet wide between the Atchafalaya and Sabine Rivers.

No funds have been allotted to date for planning or construction of the modification. Acts of assurances of local cooperation from the 11 parishes through which the improvements traverse have not been furnished.

Louisiana Coastal Area (New Orleans District)

This study is to review reports on coastal area projects. The study will determine the advisability of improvements or modifications to existing improvements in the interest of hurricane protection, prevention of saltwater intrusion, preservation of fish and wildlife, prevention of erosion, and related water resources purposes.



Aquatic plant growth

Under this study, a final feasibility report on freshwater diversion to Barataria and Breton Sound basins was completed in September 1984. The report recommends that a diversion site at Davis Pond in the Barataria basin and at Caernarvon in the Breton Sound basin be implemented under the authorized Mississippi Delta Region project (Public Law 89-298).

Since the Caernarvon site was an authorized feature of the Mississippi Delta Region project, the Louisiana Coastal Area Study merely reaffirmed the feasibility of this project feature. (For status, see "Mississippi Delta Region.") A post-authorization change report recommending the Davis Pond site as a substitute for the Myrtle Grove feature of the Delta Region project was completed in October 1984 and has been approved.

Initial evaluation reports on land loss and marsh creation, water supply, and shore and barrier island erosion were completed in November 1984. The reports recommended that plans for marsh creation, water supply, and erosion control warranted more detailed investigation. Feasibility studies on land loss and marsh creation and shore and barrier island erosion were initiated in March 1985 and are scheduled for completion in 1991. These studies are being cost shared with the Louisiana Department of Natural Resources.

A reconnaissance study of hurricane protection for communities in coastal Louisiana was initiated in 1987. The study is scheduled to be completed in 1988.

Removal of Aquatic Growth (New Orleans District)

The waterhyacinth was introduced into the United States from Central or South America and exhibited at the 1884 Cotton Exposition in New Orleans. By 1898 the obnoxious aquatic plant had spread throughout southern Louisiana and Florida to such an extent that Congress was requested to intercede. The U.S. Army Engineers made a report in that year, and operations to control growth of the plant began in 1900.

From 1902 to 1937, the Corps controlled the hyacinth by treating it with sodium arsenite. During that time, operations were confined to about 300 miles of navigable waterways per year. Because of the hazards connected with handling and use, destruction by this chemical was abandoned in 1937 in favor of destruction by mechanical means. Since the late 1940's, use of the plant hormone 2,4-D gradually replaced mechanical destruction, except in unusual cases. Efforts are constantly being made to improve the methods of plant control by testing new herbicides, equipment, and application techniques. Research is also being conducted to locate and develop biological control agents.

Removal of the aquatic growth is a continuing project for which funds are appropriated annually. Authorized under the project is extermination or removal of plants which are or may become obstructions to navigation within the navigable waters of the States of Florida, Alabama, Mississippi, Louisiana, and Texas. The

estimated annual cost for maintenance in Louisiana is \$1,300,000.

There are presently 6,200,000 acres of water in Louisiana, of which it is estimated that 500,000 acres are infested with hyacinth, or are subject to infestation. With the completion of the Intracoastal Waterway, which connects many streams, the problem has been accentuated, and today operations are conducted on about 3,000 miles of waterway annually, as required.

Frequent checks are made on all of the waterways in the state to determine the existing conditions and to plan future operations. The control of unwanted aquatic vegetation has been achieved through: (1) control structures to prevent the drifting from infested areas into main waterway; (2) drifting the vegetation to salt water and self-destruction; (3) mechanical destruction by means of multiple semisubmerged saws to shred vegetation in place; (4) chemical treatment; and (5) biological control.

The work has been extended into many streams hitherto blocked to navigation, and the number of pleasure craft entering the newly opened areas has increased greatly.

The Corps has performed extensive research to develop new methods of control. New herbicides, equipment, and application methods are continually being investigated for effectiveness and environmental safety. Research is also being conducted to locate and develop biological agents to control the plant. Since 1900, the Corps has spent \$12,402,329 on control of aquatic growth.

Aquatic Plant Control (New Orleans District)

A review of the project, "Removing the Water Hyacinth," was authorized in 1945. The review report prepared by the U.S. Army Engineers in cooperation with the U.S. Department of Agriculture, U.S. Fish and Wildlife Service, and the U.S. Public Health Service has been published as House Document No. 37, 85th Congress, 1st Session. As a result of this study, Congress, on 3 July 1958, authorized a separate comprehensive project to control and progressively eradicate the waterhyacinth, alligator weed, and other obnoxious aquatic plant growths from the navigable waters, tributary streams, connecting channels, and other allied waters in the States of North Carolina,

South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas.

Amended by PL 89-298 in 1965, the project now includes the control and eradication of Eurasian water milfoil. All states are now included in the program.

Benefits from the project accrue to navigation, flood control, drainage, agriculture, fish and wildlife conservation, public health, and related water resources development purposes. Research for development of the most effective and economic control measures is an integral part of the project. The Corps is studying the feasibility of mechanical harvesting of unwanted aquatics. By 1990, it is projected that one mechanical harvester will be used to supplement chemical control operations.

The project is administered by the Chief of Engineers under the direction of the Secretary of the Army and in cooperation with other Federal and state agencies. Local interests are required to hold and save the United States free from claims that may occur from operations under the project and to participate to the extent of 50 percent of the cost of the program.

Total cost of the project, under PL 89-298, is limited to \$5,000,000 annually, allocated on a priority basis, depending upon the urgency and need of each area and the availability of local funds.

Planning work in Louisiana was initiated in May 1959. Corps of Engineers crews work in the larger streams, and the Louisiana Department of Wildlife and Fisheries crews carry operations beyond this point into the *leeder areas and lakes in north Louisiana*.

Work in Pearl River Basin (Vicksburg District) is carried out under the expanded program by the Department of Wildlife and Fisheries, which is under contract with New Orleans District. Additional work which can be done effectively by the state crews is assigned on a cost reimbursable basis, depending on the availability of funds.

As a result of this work, recreation activities along Louisiana's numerous waterways have increased greatly. New channels to pleasure spots have been made available for general public use. The sum of \$7,715,984 has been spent on this project since 1959 in Louisiana by the U.S. Army Corps of Engineers.

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